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COMMITTEE ON INDUSTRY AND TRADE

Factors in Industrial and Commercial Efficiency

Being Part I of a Survey of Industries

WITH AN INTRODUCTION BY THE COMMITTEE

LONDON:
PRINTED AND PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE
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COMMITTEE ON INDUSTRY AND TRADE.

INSTRUMENT OF APPOINTMENT.

Whereas it has been represented to me, the Right Honourable James Ramsay MacDonald, Prime Minister, First Lord of the Treasury and Secretary of State for Foreign Affairs, by the President of the Board of Trade, that it is desirable to inquire into the conditions and prospects of British industry and commerce, with special reference to the export trade ;

Now I, therefore, do hereby appoint the following persons* to form a Committee to inquire into and report upon the aforesaid matters, and to make recommendations in regard thereto ;

Sir ARTHUR BALFOUR, K.B.E. (*Chairman*)
Mr. JOHN BAKER.
*Sir WILLIAM BEVERIDGE, K.C.B.
Mr. HENRY BOOTHMAN.
Mr. J. T. BROWNLIE, C.B.E.
Mr. W. T. CHARTER.
Mr. C. T. CRAMP.
*Mr. HUGH DALTON, D.Sc.
Sir HARRY GOSCHEN, K.B.E.
Mrs. M. A. HAMILTON.
Mr. F. A. HARGREAVES.
Sir NORMAN HILL, Bart.
Sir JOHN S. HINDLEY.
Mr. DAVID LANDALE.
Sir W. CLARE LEES, O.B.E.
*Mr. P. J. PYBUS, C.B.E.
Mr. ARTHUR SHAW.
Sir ALLAN SMITH, K.B.E.
Sir HUBERT LLEWELLYN SMITH, G.C.B.

I further appoint Mr. W. Carter to be Secretary and Mr. A. R. Fraser and Mr. W. L. Buxton to be Assistant Secretaries to the said Committee.

(Signed) J. RAMSAY MACDONALD.

28th July, 1924.

*The members whose names are marked with an asterisk have since found it necessary to resign, and the following additional members have been appointed :—

Sir WILLIAM ASHLEY, Ph.D. (appointed 2nd December, 1924.)
Sir W. PETER RYLANDS (appointed 30th April, 1925).

MEMORANDUM ACCOMPANYING TERMS OF REFERENCE.

The scope of the terms of reference is regarded as being on the general lines set out in the three following paragraphs, which are intended as explanatory of the subjects on which investigation is specially desired and not as an exhaustive definition of the inquiry :—

" The first question to which the attention of the Committee should be directed is the present position of British overseas trade and the prospect of British participation in the markets of the world being such as to ensure sufficient and continuous employment and a satisfactory standard of living in this country. The examination of tendencies and developments in the markets of the world and also in the chief competing countries will be involved, together with an inquiry into the growth of competition with British goods in these markets, the likelihood of its continuance, and its probable consequences.

" The second question is the ability of British industry to meet competition under the conditions thus determined and to adapt itself to changes in the nature of overseas demand. This involves an inquiry into British productive capacity and organisation, including the supply and efficiency of capital, labour and management, the present and future adequacy of raw materials and possible improvements in their utilisation, and the part played by the United Kingdom in new developments of industry, particularly those which are the outcome of scientific research. Matters to which attention might be directed are the present extent of large-scale production, its possibilities and limitations ; the efficiency of plant and equipment ; power supply and transport as factors in cost of production ; marketing organisation at home and abroad ; and the current methods of industrial and commercial finance. It will be necessary, in addition, to take account of the effect of State regulative action upon costs and output.

" The third question is that of the relations between those engaged in production. This will involve inquiry into methods of industrial remuneration, the main causes of unrest and disputes, and the methods of avoidance or settlement of disputes, as, for example, co-partnership, co-operation, Wages Boards and voluntary arbitration, State regulation of wages, and compulsory arbitration and compulsory enforcement and extension of agreements."

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Great George Street, S.W.1.
December, 1926.

THE RT. HON. STANLEY BALDWIN, M.P.

SIR,

We, the Committee appointed by your predecessor on the 28th July, 1924, "to inquire into and report upon the conditions and prospects of British industry and commerce," addressed a letter to you in June, 1925, transmitting a collection of Surveys of Overseas Markets. In that letter we stated our intention of submitting from time to time, in advance of our final report, further Surveys and collections of material bearing on different branches of the questions within our terms of reference. In February, 1926, we submitted to you, in pursuance of this proposal, a second volume forming a Survey of Industrial Relations.

The gratifying reception accorded to these volumes when published encouraged us to adopt a similar procedure for the purpose of surveying the remaining factors in industrial and commercial efficiency. The material, however, in our possession for this concluding survey is so great in amount that it has been found necessary to divide it into two parts.

We now beg to submit herewith, to be laid before Parliament if so desired, a collection of memoranda and statistics, which constitutes the first part of the survey referred to above. In accordance with the practice adopted in the two volumes which we have already submitted, we have prefixed to the present collection, in order to facilitate its study, a brief introductory summary and review.

A. BALFOUR (*Chairman*).
WM. ASHLEY.
JOHN BAKER.
HENRY BOOTHMAN.
J. T. BROWNLIE.
C. T. CRAMP.
W. H. N. GOSCHEN.
MARY AGNES HAMILTON.
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DAVID LANDALE.
W. CLARE LEES
W. PETER RYLANDS.
ARTHUR SHAW.
ALLAN M. SMITH.
H. LLEWELLYN SMITH.

W. CARTER, *Secretary*.
A. R. FRASER } *Assistant*
W. L. BUXTON } *Secretaries*.

NOTE.—Mr. W. T. Charter has been absent from the country throughout the preparation of this volume, and is still abroad. In consequence, he is not a signatory to this letter.

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INTRODUCTION.

The first two volumes issued by the Committee on Industry and Trade have been occupied by surveys, mainly based on official data, of the factors affecting the competitive power of British trade which operate in overseas markets or which concern the relationships between the different classes engaged in production. The third and fourth volumes will be occupied by a review of the remaining factors in industrial and commercial efficiency which affect British manufacturing and distributive enterprise. This review necessitates detailed surveys of the present position and prospects of each of the eight great groups of exporting trades which have been selected for special examination*. In the course of preparing these surveys it has been found that a certain number of important elements in industrial and commercial success are more or less common to a number of groups of trades, and can be better dealt with as a whole than broken up and discussed separately in connexion with each industry. In the case of other elements, certain aspects lend themselves most readily to discussion in connexion with the relevant group of trades, while others are most conveniently isolated and examined as a whole. Finally, there are some factors which are so special to particular industries that they cannot be usefully handled apart from the surveys of those trades.

It is for these reasons, and also because of the great magnitude of the mass of material with which we have to deal, that we have been led to divide this part of our survey into two sections. Part II, consisting of a detailed review of the industries, is reserved for the next volume, while the present volume will be occupied exclusively with Part I, viz., an examination of such of the factors in industrial and commercial efficiency and competitive power as seemed most suitable to be dealt with as a whole. The result of this scheme of division is that the contents of the present volume are somewhat miscellaneous in character, but they will be found, for the most part, to group themselves naturally under a small number of inter-related heads. Broadly speaking, these heads are :—

(1) *Factors affecting industrial structure,* including the scale of business undertaking, the growth of companies, consolidations and other forms of combinations and agreements, and the field of co-operative enterprise.

(2) *Factors affecting quality of production,* including such important questions as industrial recruitment, workshop training, technical and commercial education, scientific research, industrial art and standardisation.

* Iron and steel, engineering and shipbuilding, electrical manufacturing, coal, cotton, woollen, chemicals, and clothing (including boots and shoes).

(3) *Factors arising from the relation of the State and public authorities to industry and trade*, including financial and other assistance, Customs tariffs, import prohibitions and the marking of goods.

(4) *Certain aspects of the questions of industrial profits, burdens and costs*, and their bearing on national savings, leaving any more detailed discussion of the subject of costs to be dealt with, so far as the data permit, in the next volume in connection with each industrial group.

It will be readily understood from the above outline that the present volume makes no claim to be a complete and systematic treatise on the very wide range of subjects falling within its scope. It is inevitably fragmentary and incomplete, and at best it can only hope to be a substantial contribution towards the better understanding of the present situation of British industries.

The present volume, like those which preceded it, is not concerned with recommendations. Its aim is to assemble and analyse facts and tendencies and by so doing to narrow the range of economic controversy and prepare the way for the intelligent study of the problems by which British industry is confronted.

In one important respect, however, the survey, of which this volume forms the first part, differs from those which have already been published. During the past two years a vast amount of new material has become available through the written and oral evidence which we have received. In these circumstances it has been thought best no longer to confine the contents of the volumes to the official data furnished by Government Departments, but to utilise also the information elicited in the course of evidence, while taking precautions not to impair the impartiality of the review by introducing matters of personal opinion. In some cases we have also thought it desirable to initiate inquiries of our own in order to fill gaps in the information already available. Nevertheless, a very large part of the memoranda included in the present volume are derived, either in their completed form or in the shape of material to be worked up with that obtained from other sources, from the Government Departments concerned. In particular we are indebted to the Board of Trade, Board of Education and Scottish Education Department, Treasury, Board of Customs and Excise, Ministry of Labour, Department of Scientific and Industrial Research and Ministry of Transport for their invaluable help, for which we desire to express our warmest thanks. We wish also to acknowledge our deep indebtedness to the various organisations and individuals, too many to name, who have been good enough to furnish us with valuable memoranda, information and evidence, which have been of great assistance in the preparation of this volume.

INDUSTRIAL STRUCTURE.

The Scale of Business.

An important factor influencing the efficiency of an industrial undertaking is the scale on which it is carried on. Not that there is any definite and simple relation between costs of production and the scale of output. This relation is in fact a very complex one, being determined in any particular case by the interplay of a number of forces, some material, some human, acting in different directions.

Among the forces operating to increase the scale of production are the extended possibilities of specialisation, subdivision of processes, and use of mechanical power and elaborate machinery, and all the other well-known advantages which tend to make mass production cheaper than production on a small scale.

On the other hand have to be weighed the increasing difficulties of control and higher direction, the possible weakening of the "personal touch," the limitations of markets, and other factors which impose restrictions on the size of the business unit which can be most economically managed. It is unnecessary for the present purpose to investigate closely all the forces which make for greater or less economy of production as the scale of business increases. It is sufficient to note that the "typical scale" on which at any given time or place a particular class of business enterprise tends to be most commonly carried on is the resultant of all these forces, and that this typical scale tends to grow with the development of modern industrial methods, though the rate of increase varies very widely as between different industries and different countries.

Unfortunately, no official figures exist which enable us to trace the growth of the size of business undertakings in recent years. It is to be hoped that when the results of the present Census of Production are available they will be so tabulated as to lay the foundation for future comparisons. In the meantime we have to be content with the partial illustrations afforded by the results of unofficial investigations in particular trades. For example, much light is thrown on the growth of the scale of business in the cotton industry during the generation preceding the war by the statistical inquiry conducted by Professor (now Sir Sydney) Chapman and Mr. Ashton in 1914.* From this inquiry it may be inferred that the "typical" size of a spinning firm more than doubled between 1884 and 1911, rising from about 25,000 to 60,000 spindles. During the same period the "typical" number of looms in a weaving firm rose by less than 50 per cent., viz., from about 325 to 475. In these comparisons the term "business" or "firm" is used broadly in the sense of the area of production subject to a single management, which may not be identical with the production carried on in a single building or under the same financial control.

* Journal of Royal Statistical Society, April, 1914: "The Sizes of Businesses mainly in the Textile Industry."

Another example of the growth of the business unit is afforded by the manufacture of pig-iron, in which the average output capacity per undertaking, taking into account both the size of blast-furnaces and the number owned by each business, more than doubled between 1882 and 1913, and nearly trebled between 1882 and 1924.

One of the most important forces tending to enlarge the unit of business has been the growth of joint stock enterprise, which has greatly lessened the difficulty of financing large businesses by bringing in the general public as investors.* For example, of the total number of cotton spinning businesses covered by the inquiry already referred to, public companies formed less than one-fifth in 1884, but had grown to four-fifths in 1911; and in the latter year the average size of the businesses represented by these companies was over five times as great as that of the private companies and firms. From another investigation it can be inferred that in the woollen and worsted trades the average size of joint stock companies is about five times as great as that of the private firms.†

The rapidity with which joint stock companies have developed in the last forty years may be seen from the fact that their paid-up capital quadrupled between 1885 and 1905 and more than doubled between 1905 and 1925 (see table on p. 125).

Combination in Industry and Trade.

Consolidation.

So long as the growth in the scale of business enterprise is the normal result of expansion under the influence of the economic forces already noted, it is fairly certain that the development tends on the whole towards higher efficiency and reduced costs. But the expansion of single enterprises, whether "horizontally" to cover a greater area of the same processes of production, or "vertically" to carry on a greater number of successive processes under the same direction, is not the only way in which the size of businesses tends to increase. Another method which has in recent years attracted increasing public attention is the combination or consolidation under a single management of a number of hitherto independent enterprises. The various economic and financial methods and devices

* How far the diffusion of ownership of capital in joint stock companies has gone may be seen from the figures on pages 127–8, showing the number of holdings of capital in the five large joint stock banks and in other eighteen large undertakings, including manufacturing, trading, shipping, and insurance companies. The total capital of these concerns is £212 millions, which is distributed over 779,000 holdings, the average holding being only £272. The figures on pp. 129–30 also show that nearly 86 per cent. of the holdings of the capital in the eighteen large undertakings referred to are of £500 or less. In the case of the four great railway companies, 56 per cent. of the holdings are of £500 or less.

† Journal of Royal Statistical Society, January, 1926: "Distribution of Employment in the Wool Textile Industry of the West Riding of Yorkshire," by A. N. Shimmin.

by which these consolidations may be effected are described on pages 72–73 of the Memorandum on Combination in Industry and Trade, printed in the present volume. Four principal methods are there distinguished, viz., the voting trust, the exchange of shares, the holding company and the merger. While these distinctions are of interest from the historical and technical points of view, experience shows that their practical economic results are not appreciably different; and the history of attempts in the United States to prohibit particular methods of arriving at unification proves that the organisers have experienced little difficulty in substituting one device for another, when necessary in order to evade the prohibition.

Among the chief practical differences between the result of expanding a single undertaking and of consolidating several undertakings is that the latter process frequently involves the necessity of acquiring relatively inefficient businesses on uneconomic terms and of either retaining the services of redundant employees or of compensating them if displaced. Moreover, the local distribution and arrangement of consolidated works are unlikely to be so well suited for the most economic production as the lay-out of an undertaking originally conceived and planned throughout as a single whole. Some of these disadvantages of consolidation may be compensated by redistributing the work among the individual concerns on more economic and specialised lines. Generally speaking, however, consolidations are not formed with the sole object of increasing efficiency and reducing costs, but with the aim of restricting or regulating competition, and so strengthening the position of the unified undertakings in relation to the consumer on the one hand and the suppliers of materials and means of transport on the other. It is probably for this reason that the growth of consolidations is rather associated in the public mind with that of cartels, price-fixing associations and monopolies, than looked on as a method of increasing the scale of business undertakings. In current discussions it is often assumed as axiomatic that a great reduction of costs is a certain result of consolidation, and attention is mainly directed to the problem of securing that an adequate share of the advantages of this reduction will be passed on to the public, and not intercepted by the combination through the exercise of its monopoly power. From the point of view of safeguarding the public interest this attitude is natural, but the public interest in the results of consolidation is not confined to the allocation of the benefits reaped as between the combination and the consumer. It is at least equally concerned with the nature and sources of those benefits, and in particular with the question how far they arise from a real increase in productive efficiency and how far from the enforcement of restrictive conditions in respect of output, prices, or markets. The public is also concerned with the question how far the share of benefit which is retained by the combination is absorbed by profit, or goes to improve the conditions of employment and indirectly to increase purchasing power.

Much more interesting from an economic point of view than the nature of the technical and legal processes by which unification is effected is the structure of the consolidation itself, and especially the question whether it is arranged "vertically" to include a succession of processes from raw materials to finished product, or "horizontally" to embrace a wider area of the same processes. In Great Britain, the vertical consolidation has become common in the iron and steel trades, where many large works have acquired their own coal and iron mines. Pig iron manufacturers now control the bulk of their supplies of ore and coal. Some of the most recent big fusions (such as the amalgamation in the chemical and allied industries in 1926) partake both of a "vertical" and "horizontal" character. In Germany, the various vertical combinations in the iron and steel and the coal trades were found to be a serious obstacle to the "horizontal" expansion of the Rhenish Westphalian Coal Syndicate, and the conflict of interests between the so-called "pure" and "mixed" firms threatened at one time to break up the Syndicate, which was only reconstituted by compulsory government decree in 1924.

The economic motives and results of "vertical" and "horizontal" consolidations are clearly far from identical. For example, one great inducement in Germany to the formation of vertical combinations after the war was the desire to escape the turnover tax. Many of these vertical consolidations have since been dissolved.

According to the memorandum (see page 76), Great Britain can show examples of every form of consolidation, though the "Vertical Trust," while it has given the popular name to this class of organisation, is now mainly of historic interest in connection with a past phase in American developments. British economic conditions have not hitherto proved nearly so congenial a soil for the growth of consolidations as the United States, though many notable examples exist both in the great exporting trades specially selected for examination (e.g. iron and steel, coal, engineering, textile finishing, sewing thread, chemicals, explosives and kindred trades, etc.), and also in other industries (tobacco, distilling, soap, seed-crushing, etc.). Particulars of consolidations in the groups of industries specially selected for examination will be given in the detailed surveys of these industries which will form the subject of the next volume. In spite of the public attention which consolidations attract, they cover but a very small proportion of industry as a whole. The latest great consolidation, viz., in the chemical and allied industries, is a closer union by means of a "merger" of four existing consolidations, some of which had already working agreements among themselves; and, while making combination more effective and complete, it does not materially increase the area of industry covered thereby.

The relatively slow growth of consolidations in Great Britain compared with the United States of America is certainly not due to any legislative discouragement, for there is no legal or legislative

impediment in this country to the free growth of giant business organisations, while, on the other hand, the Americans have continually attempted for many years, though with indifferent success, to check the growth of trusts and monopolies by legal proceedings and repressive legislation.

Trade Agreements and Cartels.

Some of the results at which consolidations aim, e.g. the restriction of competition and the reduction of costs, can in some circumstances and to a varying degree be secured by agreements of various kinds among independent undertakings, falling short of unification. The memorandum, on page 71, classifies existing types of trade agreements under nine heads according to their main features and the degree of stringency of control which they establish. These different types range from the informal "gentlemen's agreement," through various forms of association for the fixing of prices, establishment of pools, regulation of output, allocation of contracts, and joint selling, up to the association which aims at a financial community of interest through an arrangement for the pooling of profits for a period of years. It would be an error, however, to lay too much stress on the details of this classification, for in practice an association formed for certain purposes often adds new objects or allows some of its original objects to fall into disuse. The common feature which runs through all these types of agreements and organisations and distinguishes them clearly from consolidations is that they are all terminable, and that therefore the separate existence, and to some extent the separate interests, of the various undertakings concerned remain intact. Hence, whatever be the financial and other obligations imposed on the several undertakings while the agreement is in force, no permanent unification of financial interest is involved. In these circumstances, there is often considerable resistance to the enforcement of measures for reducing costs and eliminating waste, which, though to the interest of the combination as a whole, may place some of the constituent undertakings in an unfavourable position for resuming competition in the event of withdrawal from the association or termination of the agreement. For this and other reasons it is generally much more difficult to realise the full economies of unification by means of a terminable association than by a complete merger, and it is probably true to say that terminable agreements have, generally speaking, tended to rely for their success more on the enforcement of restrictive conditions and less on the attainment of positive economies than the consolidation or giant business.

The memorandum gives interesting details of a number of agreements of various types in different industries in Great Britain. The methods most commonly employed are the fixing of minimum prices and the pooling of output, sometimes coupled with

a system of deferred rebates to encourage exclusive buying. Associations for restricting output or for joint selling are relatively uncommon, and fully developed cartels on the German model, with arrangements for joint selling combined with pooling, are also rare.

One interesting form of organisation which exists in more than one industry is a terminable association which includes most of the firms in the trade, but is in practice dominated by one or more giant undertakings or consolidations. This is the situation, for example, in the dyeing, printing and bleaching branches of the textile trades, and also in the chemical, salt and soap industries.

Terminable agreements for regulating prices cover most of the non-ferrous metal industries, and are found in almost all branches of the iron and steel industry subsequent to the production of pig iron and ingot steel, including a great part of the more standardised metal products, such as light castings, tubes, wire ropes, bedsteads, etc. There are also important price-fixing associations in connexion with electric cables and lamps, and some of the more specialised sections of engineering. In the chemical industries, besides the great consolidations there are a number of price-fixing associations. In the cotton trade there has hitherto been little attempt at price-fixing, with the important exception of the finishing branches, where the woollen and worsted industry is also concerned. In certain branches of that industry (e.g. combing and carpet manufacture) prices or production are regulated by agreements. In the clothing trades, competition remains the dominant factor. Terminable associations for regulating prices or production are also found in several industries outside the eight groups of exporting trades e.g. china clay, pottery, glassware, match-making, etc. In the realm of transport there are important combinations, e.g. the "Shipping Conferences," which regulate shipping freights and other matters affecting sea transport. Railway transport formerly offered striking examples of working agreements for determining charges and restricting competition, but these have now been partly superseded by the compulsory amalgamation of groups of companies under the Railways Act, 1921.

Results of Combination, etc.

Any attempt to measure the area of industry affected by agreements and consolidations which aim at the regulation of prices or production is beset with great difficulties. Not only are the data very defective, but industries are so inter-dependent, and so closely affected by the conditions of distribution and transport, that many branches of industry which are themselves substantially free from combinations may, nevertheless, to a greater or less extent feel the influence of combinations in other branches of industry and trade or transport from which they derive materials, equipment, or services, or through which they market their products. If, however,

we confine attention strictly to manufacturing and extractive processes carried on in Great Britain, it is probable that the proportion of the whole area (as measured by the number of persons employed) which is subject to the direct influence of combinations does not at the outside exceed one-fifth, and may be considerably less. Generally speaking, it may be said that unmanufactured and semi-manufactured products are more suitable for "cartellisation" than finished goods for consumption, with their infinite variety of types and grades.

The prevalence and growth of consolidations and terminable agreements, the constant attempts to reconstruct associations which for any reason have broken down, together with the observed tendency (illustrated by the latest combination in the chemical trades) of the parties to partial unions or agreements to replace them by consolidations or cartels of wider scope or closer texture, afford a very strong presumption that the parties directly interested generally regard combination as an economically effective method of increasing their gains, or at least of defending themselves against "cut-throat" competition. It would be highly interesting to know in what proportion any realised benefits arise respectively from enhanced efficiency and reduced costs, and from the enforcement of restrictive conditions through the exercise of monopoly power. But no statistics exist, and none could probably be obtained, which would enable this analysis to be made. All that can be said is that, generally speaking, the greater the completeness and permanence of the fusion of interests, the greater is the opportunity of substantial economy, though the importance of the personal factor is so great that no statement of universal validity can be made.

Some information as to the recommendations of various Committees and other bodies for safeguarding the public interest against the operations of trusts and combinations will be found in the Memorandum on pages 88–92. It will be seen that in practically all of these, the enforcement of publicity occupies a first place. It is, therefore, of interest to refer to the recommendations on this subject of the Committee which has recently reported on Company Law.* These are set out on pages 132–4. They have, it is true, no special application to combinations as such, but since every consolidation, however arrived at, must either be a giant company or a group of companies managed or controlled in common, the recommendations as to publicity would, so far as they go, apply to such organisations.

Comparison with America and Germany.

It is impossible in a short introduction to summarise the information which will be found in the sections of the Memorandum relating to combinations in Germany and the United States. Broadly speaking, it will be seen that in both these countries combination

* See also second footnote, p. 11.

has made more progress and struck deeper root than in Great Britain, but that in two respects they present an interesting contrast to each other. While most types of combination are represented in each country, Germany is the classic land of the Cartel or pool with attached selling syndicate, whereas the United States is pre-eminently the country of giant consolidations. Moreover, German developments owe a considerable debt to the favourable attitude and sometimes the positive encouragement of the State, whereas in the United States the growth of combinations has taken place in the teeth of very persistent and formidable opposition on the part of the public and the legislature.

It may perhaps be of interest to compare briefly the position of Great Britain, Germany and America in respect of the attitude of the law and the administrative authorities towards various forms of combination. In this respect Great Britain may be said to occupy a position midway between that of Germany and the United States. In the case of complete consolidations there is, as already stated, no legal obstacle in Great Britain to their growth, and, generally speaking, no special conditions are imposed on them beyond those applicable under the Companies Acts to the different forms of joint stock companies. Naturally, when a company derives special powers from Act of Parliament, statutory order or charter, conditions may be and sometimes are imposed either restricting its power of combining with other companies or protecting the public against the results of such combination. Thus, when Parliament compelled the amalgamation of groups of railway companies, it set up a tribunal to control railway rates. But we are here mainly concerned with industrial organisations in general and not with the special case of public utility companies, which, being more or less endowed by the State with monopolistic rights, have necessarily to submit to some degree of public control.

As regards terminable agreements and associations, the neutral attitude of the State is qualified by the application of the doctrine of the English common law, that agreements "in restraint of trade" are legally unenforceable. The same doctrine is part of American law, but it has been somewhat differently interpreted by the British and American courts. British decisions, influenced by regard for the sacredness of contract, have on the whole tended, especially in recent years, to narrow the scope of the doctrine; while American courts, attributing more weight to the injury inflicted by monopoly, have leant towards a much wider interpretation of "restraint of trade." As a result, there was already a material divergence between the law of the two countries, as defined by judicial decision, even before the enactment of the series of American statutes against combinations, from the Sherman Anti-trust Law of 1890 to the Federal Trade Commission Act and the Clayton Act of 1914. The history of this legislation is summarised on pages 104-9. Briefly it may be said that for many years efforts were concentrated on dissolving

particular forms of combination, but the results achieved were practically nil, as the lawyers advising the organisations attacked found little difficulty in re forming them on a different basis. The Federal Trade Commission Act proceeded on a different line, the aim being to suppress unfair competitive practices rather than types of business organisation. For this purpose unfair methods of competition* were declared illegal and the Federal Trade Commission was constituted to administer this provision, together with the provisions of the Clayton Act passed in the same year. Though the Commission has shown great activity and has pronounced important decisions, it is doubtful if the hopes of its founders have been realised, and it is noteworthy that a large number of its Orders have been upset by the courts, which have insisted on their right to judge whether any particular method of competition is unfair.

The German attitude towards combination has been even less restrictive and more "liberal" than the British, there being nothing in German law corresponding to the doctrine of restraint of trade, except possibly the provisions of the codes prohibiting extortion and "acts repugnant to good morals." The attitude of the German Courts has generally reflected that of the Government, which has regarded trade associations as a necessary and beneficial part of national industrial organisation. In 1910, when a breakdown of the potash cartel was threatened, legislation was passed to establish a compulsory syndicate. In 1924, as mentioned, the Rhenish Westphalian Coal Syndicate was re-constituted by compulsory Government decree. Recently also, the State gave positive encouragement to fusions in general by the temporary reduction of the stamp duty payable thereon.†

It is interesting to note that in America there are many signs of a reaction against the undiscriminating hostility which has so long been shown by popular opinion to all forms of combination. The

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* i.e. unfair to a competitor. In the "Mennen" case (see p. 107) the Circuit Court held that the law only prohibited discriminations tending to injure a competitor or seller, and not discriminations injurious to the class of purchasers discriminated against.

† The Company Law Amendment Committee referred to on page 132 made a number of recommendations intended to facilitate amalgamations of companies, and in particular it recommended that, in the case of amalgamations where 90 per cent. of the capital of the new company was held by shareholders of the amalgamating companies, *ad valorem* stamp duty should not be charged either on the transfer of property to the new company or on the capital of the new company (except so far as it exceeded the capital of the old company). The Railways Act, 1921, which provided for the compulsory amalgamation of groups of railway companies, contained a provision specifically relieving the companies from the stamp duties which the amalgamations would otherwise have involved; and the Mining Industry Act, 1926, similarly provides that stamp duty shall not be payable in connection with amalgamation or absorption schemes for coal mines in pursuance of the Act.

formation of the Federal Reserve Board in 1914, the Webb-Pomerene Act of 1918 relaxing the anti-trust law in relation to combinations for export trade, and the publications of the Department of Commerce setting out the advantages of industrial agreement are significant indications of the change. On the other hand, Germany in 1923 for the first time made legal provision for regulating the activities of cartels, though this did not go much beyond the establishment of a tribunal empowered under certain conditions to make their rules unenforceable.

International Combinations.

Modern trade has become so international that it is not surprising that a considerable number of international cartels and agreements have been organised. Before the war 114 such cartels were known to exist, of which the coal and metal industries accounted for 26, chemicals 19, transport 18, and textiles 15. The most usual objects of these cartels were the delimitation of markets, together in some cases with the regulation of prices and selling practices or the exchange of technical information. Most of the pre-war international cartels were broken up by the war, but a good many have since been re-formed, sometimes on a modified basis or with different participants. On pages 111–114 will be found particulars of some of the more important of the existing cartel agreements, including the new European steel cartel and the revived international rail makers' agreement. There are also a number of powerful consolidations or "trusts" the operations of which are international, relating to such industries as mineral oil, tobacco, sewing cotton and matches.

The Internal Structure of Industry.

Any review of industrial structure would be incomplete which only took account of such tendencies as are referred to in the foregoing pages, e.g., the growth of the business unit, the transformation of private firms into joint stock companies, and the union of separate units by means of consolidations and agreements. Important as are these developments, they are hardly more significant than the marked changes which have taken place in internal business structure and in the lines of demarcation between the functions performed by separate undertakings. When speaking of combination, we have had occasion to draw a distinction between two competing principles underlying the growth of business enterprise, viz. between "vertical" and "horizontal" extensions. But the growth of the scale of the business unit is by no means the sole, or even the decisive, factor in the tendency towards the "vertical" organisation whereby all or many of the successive stages of production and distribution are united under one management instead of being carried on by a series of independent undertakings each passing on its products by sale to the next. On the contrary, the evidence shows that the strength or weakness of this tendency varies very widely in different

branches of industry, and depends on the stage of their evolution and the particular circumstances of their activities, no less than on the scale on which they are carried on. In the next volume, which will survey each of the great groups of exporting trades, these characteristic differences of internal organisation will be further considered. It will be seen, for example, that in the main branches of the textile trades the dominant practice is to subdivide the process of production among a series of independent undertakings, though the existence of "mixed" firms is far from uncommon, and there are a few important undertakings which are organised on the "vertical" plan, including the marketing of their finished products. In the iron and steel trades, on the contrary, the growing tendency is for the same business to own or control coal and iron ore mines, blast furnaces and smelting works, and the manufacture of certain classes of iron and steel products.

While it cannot be said that the evidence before us discloses any clear line of development in this matter common to all branches of industry, it is plain that in several trades recent tendencies have been in the "vertical" direction, at least to the extent of uniting the productive and marketing organisations. It cannot be doubted, however, that Continental and American practice has gone much further than British in this direction, and that the independent merchant house occupies a far more powerful and firmly established position in Great Britain than in any of the chief competing countries. In Germany, for example, there is a strong tendency for the manufacturer to interest himself in the whole series of productive and distributive operations from raw material to final disposal of the goods, in strong contrast to the system under which each undertaking is confined to the performance of its own comparatively narrow function, without responsibility or interest in respect of the antecedent or subsequent stages of production and distribution. Perhaps the system of horizontal cleavage reaches its climax in the characteristic organisation of the Lancashire cotton trade, which relies chiefly on export to a large number of external markets, and has evolved a unique system of structure suited to these conditions. Here a very large part of the functions of the "entrepreneur" or business "undertaker" is performed by the merchant or "shipper" in Manchester, who studies particular overseas markets, and to whose order, and under whose direction, and by whose financial co-operation the successive processes of manufacturing, bleaching or dyeing, printing and packing are carried out by a series of firms, most of which do not know the destination of the finished goods. In other trades the function of the merchant is very much more limited, and the main initiative and financial strength rest with the manufacturer. In some industries the two systems work side by side, the larger firms doing their own marketing and the smaller firms selling through merchants. Combined selling organisations are still uncommon in Great Britain, as is also the practice, well established in America and

Germany, whereby large undertakings or combinations entrust their marketing to subsidiary merchant companies controlled by themselves, but free also to sell the non-competing products of other firms.

The hotly-contested question of the relative merits of manufacturers' selling organisations and the employment of merchants, brokers and other distributive middlemen is one which cannot be usefully discussed apart from the detailed surveys of the evolution and conditions of each industry. Here we only note the question as having an important relation to the form and growth of industrial structure. In this connexion, however, it is of interest to observe that the condition of an industry in respect of "vertical" organisation has a definite bearing on the development of combination in that industry. There can be little doubt that, other things being equal, the more comprehensive and self-contained business is the more likely to join itself to other similarly organised businesses so as to build up a giant consolidation or cartel, and it is not improbable that the relatively slow growth of combinations in Great Britain may be partly connected with the prominent position in British industrial and commercial economy occupied by the merchant house and other types of middlemen. It may also be observed that the utility of the functions performed by the separate merchant house in relation to manufacture for export is not confined to the marketing of these manufactures, but extends to the marketing of the products from overseas, whereby they are paid for. Thus the importing merchant house plays an important part in the chain of agencies by which the circle of production, distribution and exchange is completed.

Another question having a very important bearing on industrial structure is the relation, internal or external, between the manufacturer and the supplier of various technical and professional services which are essential to production. Here, again, wide divergencies of practice prevail, depending partly on the scale of the business unit, partly on a variety of conditions peculiar to particular branches of industry. The special case of artistic design is discussed in the memorandum on p. 336 and in a later section of this introduction, from which it will be gathered that the divergence of practice between the employment of a designing staff within the ambit of the manufacturing business and the purchase of designs from studios carried on as separate undertakings may in some circumstances be more than a mere question of industrial structure, and may have important repercussions on the standard of industrial art. Similar differences obtain with regard to the provision of technical, scientific or professional services of various kinds which are essential to industry, including such matters as laboratory testing and research, technical advice on engineering problems or on patent questions, accountancy and legal advice—all of which services can be either obtained from independent firms or consultants in return

for a fee, or to some extent at least performed by qualified members of the manufacturer's staff. An analogous case is that of insurance against risks of various kinds, which in the case of businesses of ordinary size may be effected either by paying a premium to an independent insurance company or underwriter, or by subscription to a mutual club, while the large business may prefer to carry some of these risks itself.

In all these matters the scale of the undertaking is one of the most important determining factors, and it would therefore seem *prima facie* probable that with the growth in the size of the business unit an increasing proportion of these professional and special services tend to be provided within the structure of the manufacturing business. There is, however, no statistical evidence by which this presumption can be verified, and doubtless the prevailing practice varies materially in different industries, the tendency to absorb these kinds of services within the business being naturally greatest where the flow of demand for such services is most even and uniform, and least where there is the widest range of variety and fluctuation.

The Co-operative Movement.

The term "co-operation" is sometimes loosely applied to all forms of combined effort and agreement for the attainment of common ends, including the various types of associations, cartels and consolidations which have been considered above. It is, however, used in a more special sense to designate the definite types of industrial structure associated with the workmen's co-operative movement of which a history and description are given in the Memorandum on page 114. As is there pointed out, the co-operative movement has developed differently in different countries. The original aims of the founders were very wide, and perhaps in the light of the actual results since achieved they may seem unduly ambitious. The aims of the pioneers of co-operation were in fact social no less than economic, and they looked forward to fundamental changes in social relations as the result of the development of the movement. Whatever may have been the disappointment of these hopes, there is no doubt that the co-operative movement has resulted in the creation of a form of business organisation which is of the highest interest to any student of industrial structure. It has approached the problems of large scale production and of combination from an entirely different angle from that of the trust or cartel, and has arrived at a solution of the question of the relations between producer and consumer which, within certain limits, has been remarkably successful.

In Great Britain the characteristic type of co-operation which has shown the greatest evidence of permanent vitality on a large scale is that founded on the association of consumers. The unit of this type of co-operation is the Co-operative Retail Distributive Society, on the basis of which has been built up a vast federated business for the

supply of the wants of members of the societies, including not only a great inter-connected series of retail shops or stores, but also two huge "wholesale" societies with distributive and productive departments, as well as productive branches attached to the retail societies themselves.

The magnitude and growth of the whole organisation is indicated by the following statistics. In 1924 there were in Great Britain 1,368 retail distributive societies, with 4,642,000 members. As it frequently happens that only one person in a family is an actual member of the society it will be seen that the section of the population of Great Britain which draws its supplies wholly or partly from co-operative societies is very considerable. The total membership of the retail societies has grown much more rapidly than population, having increased by over 50 per cent. between 1914 and 1924, and nearly quadrupled in the last thirty years. The total value of the sales of the retail societies in 1924 was £174 millions, compared with £87 millions in 1914 (equivalent at 1924 prices to about £152 millions).* The sales per head of membership amounted to £38 in 1924, compared with about £50 in 1914 *on the basis of* 1924 *prices*.* Hence, if account be taken of changes in the value of money, there has been a decrease in the *per capita* volume of retail sales, which is variously attributed to reduced purchasing power, or to a falling off in the ratio of purchases made by members through the stores to their total outlay; or to a combination of these factors. The decline was most notable in the two years immediately following the war, since when there has been some revival of the *per capita* sales.

More than one-half of the goods sold (£90 millions in value) were purchased from the wholesale societies, which are owned and controlled by the retail societies, and of this amount rather over one-third (£32 millions) were produced† in factories and workshops owned by the wholesale societies either separately or in common. But this production by no means exhausts the total productive output of co-operative societies. Nearly an equal amount (£30 millions) is produced† annually by productive departments of retail societies, besides a certain amount of production carried on by independent societies. Over two-thirds of the value of co-operative production is accounted for by foodstuffs, but the wholesale societies also produce textiles, clothing, boots and shoes, soap, furniture, various classes of metal manufactures, etc.

One of the most important features of the co-operative movement, besides its democratic constitution based on the organisation of the consumers, is its treatment of any surplus which remains after meeting expenses of all kinds including a fixed interest on share capital.

* The conversion is based on the Ministry of Labour cost-of-living index number, the average of which for 1924 was 75 per cent. above the level of 1914.

† The values quoted represent *gross* production. See footnote, p. 119.

This surplus (which in an ordinary business would be distributable to shareholders) is considered to belong to the consumers and is returned to members (and sometimes also to other customers) in the form of a dividend on purchases, the average rate of which in 1924 was 1*s.* 6*d.* in the £. Co-operative societies share in the benefit of the decision of the House of Lords, given in 1889, to the effect that a "Mutual" Insurance Company which distributes all its surplus to policy holders is not liable to income tax.* The exemption of co-operative societies was specially provided for in the Income Tax Act of 1918, Sec. 39 (4). The representatives of distributive trades contend that the effect of the law is to give co-operative societies a privileged position in comparison with their competitors. This matter has been the subject of two public inquiries, first by a Departmental Committee in 1905, which recommended that no change be made in the existing law, and more recently by the Royal Commission on the Income Tax which reported in 1920. The Royal Commission by a majority recommended that the immunity of co-operative societies should be limited to the sums actually returned to members as dividend or discount, thus bringing within the scope of income tax sums placed to reserve, and income from investments and dividends to non-members. At the same time the Commission expressed the view that "there would be very little difference between the liability of co-operative societies under our proposals and under the existing legal position that has given rise to so great an amount of feeling."† This recommendation was subject to three reservations‡ of which the first two (signed by seven and two members respectively) favoured, though on different grounds, the substantial maintenance of the existing law, while the third reservation (signed by two members) endorsed the finding of the majority while modifying the reasoning on which it was based. So far no action has been taken on the recommendation.

The self-governing workshop owned by its employees, which was the ideal of some of the early co-operators, has not to any substantial extent been realised. It is true that "associations of workers" produce goods to the value of about £3 millions annually, but their employees furnish less than one-fifth of the members and own less than one-fifth of their capital. Not less significant is the fact that most of these societies have entered into close relations with distributive (consumers') societies, which are the principal outlet for their products.

* In 1885 the House of Lords decided by a majority that when a proprietary insurance office returns part of profits to policy holders, the *whole* of profits and not merely the remainder is liable to income tax [Last *v.* London Assurance Company]. In 1889 the House of Lords (also by a majority) decided that if a "mutual" company returns the *whole* surplus to policy holders the situation is a different one, and there is no liability to income tax. [New York Life Insurance Company *v.* Styles.]

† Report, pp. 120 and 122.

‡ *Ibid*, pp. 163–7.

Up to quite recent times a number of consumers' societies (including the Scottish Wholesale Society) distributed part of their surplus to employees by way of profit sharing, but this practice has been declining and now affects only a small proportion of the total number of societies. Other forms of co-operative enterprise are mentioned in the Memorandum, e.g. in connexion with agriculture, banking, insurance and housing, but none of these developments are sufficiently important to need special comment in this introduction.

The claim of the co-operative movement to have reduced the cost of distribution by eliminating useless middlemen is best examined in connexion with the general consideration of retail costs in the next volume.

TRAINING AND RECRUITMENT.

Industrial output is not a mere question of volume, but depends essentially on quality. To attain the highest degree of productivity it is not only necessary that all grades of workers should work hard; it is at least equally important that they should work well. Thus, skill in the widest sense is a factor in efficiency no less important than energy and application, and the problem of creating and maintaining skill is one of the crucial problems of industry. The term "skill" is here used not with any narrow technical meaning, but in the broad sense of *capacity to produce work of high quality under commercial conditions*. In other words, it includes all kinds of ability whether inherent or acquired, and irrespective of any particular method of training, but it is limited to a capacity which is effective under current economic conditions, and hence is of practical value in industry. Ability to produce good results, but only under non-economic conditions, may, and often does, mark an essential stage in the preparatory training of a skilled worker, manager or designer, but it is not until this intermediate stage has been passed that the term "skill" can properly be used.

The present discussion is primarily concerned with the element of *acquired* skill and with the various ways in which it may be acquired. Of these ways one of great importance, but sometimes insufficiently recognised, is the half-conscious absorption of knowledge and experience which takes place especially where an industry is highly localised, and generation after generation of workers of all grades are bred in the same industrial "atmosphere." The old traditional crafts, which are now fast being displaced by modern industrial production, propagated themselves at least as much in this way as by the definite training of apprenticeship. On a long-period view of world conditions as a whole—east, as well as west—this element in the creation, preservation and transmission of traditional skill is of the highest importance. Under modern industrial conditions, however, in a country like Great Britain, its relative range and potency have tended to diminish as compared with the more definite

processes of school education and workshop training. Of these, the latter is still the more important single factor in the preparation for industry, whether the training be consciously directed as in the case of apprentices, or more casually acquired as in the case of many semi-skilled occupations. Nevertheless, as will be seen below, the growth of large-scale machine production during the past century has largely transformed the conditions of workshop training, both by modifying the objective to be aimed at and by limiting the means which it is practicable to employ in order to reach this objective, though, on the other hand, it remains important to provide a thorough general training so as to produce a sufficient number of skilled craftsmen.

Amid the decay and growing inadequacy of the two practical methods of acquiring skill described above, a third element has steadily acquired increased importance, viz., the education provided by various grades and types of schools and classes, either before entry into industrial life, or concurrently with workshop employment. It cannot be said that there is as yet any general consensus of opinion, either in the industrial or in the educational world, as to what should be the precise scope, character, limits and mutual relations of workshop training and school teaching, looked upon as complementary factors in the preparation for industry. It is hoped that the surveys of apprenticeship, and of technical and commercial education which are printed in Chapter II will be of assistance in arriving at clearer views on this vitally important question.

Workshop Training.

Valuable light is thrown on the whole subject of workshop training by the memorandum furnished by the Ministry of Labour which begins on page 136. The prevailing types of recruitment of skilled or semi-skilled labour may be classified under four main heads, (1) apprenticeship under indenture or written agreement, (2) apprenticeship without written agreement, (3) learnership, (4) promotion of youths engaged as labourers or attendants. We are here mainly concerned with the first three heads. The fourth is not so much a method of systematic training as a customary means of recruiting certain trades, e.g., mining and heavy chemicals, which do not require skilled craftsmen in the strict sense of the term, except for such purposes as upkeep of machinery and premises. In industries in which this system is prevalent, any knowledge or skill is usually picked up by observation and experience rather than acquired by any defined system of directed instruction. As regards the other types of training, little stress need be laid, from the economic point of view, on the distinction between apprenticeship under written and unwritten agreements respectively. For traditional and other reasons, some trades and districts and some firms within a trade adhere more than others to the old system of legal indentures, but over a large and

probably increasing area of industry verbal or written agreements, with their greater elasticity and greater appearance of freedom from legal constraint, are now more customary. Economically the results of the two systems are not very different, and the term "apprenticeship" will here be used of both. Nor is there any very clearly marked line to be drawn in all cases between "apprentices" and "learners," though generally speaking the latter term implies a looser relationship with fewer and less defined obligations and duties than the term "apprentice." In some industries, notably cotton, learnership constitutes the regular avenue for the recruitment of skilled workers, and in others for the recruitment of semi-skilled workers; and, in still others, it is an avenue alternative to apprenticeship.* On the other hand, apprenticeship is the most usual method of training craftsmen in shipbuilding and engineering. Broadly speaking, and taking a long-period view, it may be said that the stricter forms of apprenticeship are the older, and that they have gradually given way to looser and less definite arrangements, as the development of the great industries based on large-scale machine production and sub-division of employments has more and more altered the position of the all-round skilled workman and changed the whole character of workshop organisation. One result of this evolution is the emergence of "learners" as a separate though not very clearly defined class. Another result is the growing inadequacy of workshop organisation to provide within itself a complete training for skilled employment. Hence the growing recognition by thoughtful employers and workmen of the need for technical instruction concurrently with workshop experience.

Before considering how far this need is at present met, it is necessary to obtain some picture of the existing position of British industries in respect of recruitment and training. The Memorandum, on page 138, shows that the principal industries in which apprenticeship is the predominant practice for the training of craftsmen include engineering and shipbuilding, building, furnishing and woodworking, pottery, vehicle making, and certain of the distributive trades. In coal mining, heavy chemicals and iron and steel manufacture apprentices are only found in any number among the staff employed on maintenance work. In the textile trades and most branches of the clothing trades apprenticeship is rare.

Altogether, it may be provisionally estimated that skilled industries† as at present organised find places for about 300,000 lads who pass through, or at least are supposed to pass through, a more or less systematic course of workshop apprenticeship. As the most usual duration of training is five years, this appears to indicate that (if due allowance is made for wastage) skilled industry can absorb every year perhaps 80,000 such boys.

* The special case of learnership in trades covered by the Trade Board Acts is fully dealt with in the Memorandum.

† Not including agriculture or transport.

The most usual ages of entry for apprentices are 14 and 16, the higher age being the most prevalent in shipbuilding, and the lower age in the building trades. In the engineering trade both the lower and the higher ages of entrance seem fairly common. The available figures do not enable an exact calculation to be made of the number of apprentices who enter industry at each age, but it is probable that not less than half the apprentices in industrial establishments enter at or above the age of 15, and perhaps a third of the whole number at or above the age of 16. This involves for large numbers of boys a gap of one or two years after leaving an elementary school and before entering skilled employment. The interval is sometimes filled by attendance at a secondary or junior technical school, but more often by some intermediate form of employment, frequently of a casual or "blind alley" type. "Learners" usually enter the workshop at 14, except in certain heavy industries, notably iron and steel and chemicals, where 16 is the usual age. In some cases, as regards both apprentices and "learners," the later year of entrance is dictated by the heavy or trying nature of the work or is connected with the necessity of night shifts.

The total number of boys who leave elementary schools annually in Great Britain at or about the age of 14 is in the neighbourhood of 320,000, so that it would appear that roughly one-quarter of the total number go to fill places in skilled industrial employment where they receive some form of progressive workshop training. Of the remaining three-quarters a certain proportion go on to higher schools, whence they enter commercial, professional or other non-industrial occupations, a large number enter agriculture or go direct into commercial, distributive or transport employment, many more are absorbed by great industries such as mining, chemicals, etc., which they enter as labourers with limited chances of eventual promotion to semi-skilled or skilled work. Finally, many go into purely unskilled or casual occupations offering little prospect of a progressive career.

How far the situation indicated by the above analysis represents fairly normal and permanent conditions or is materially affected by the present abnormal state of unemployment, and how far it tends to improve or to deteriorate, cannot be tested statistically. It is, however, certain that, in a period like the present of widespread and prolonged unemployment, many employers necessarily rely to a large extent for their supply of skilled labour on re-absorbing the adult unemployed rather than on training fresh entrants. On this ground it is to be expected that the present annual intake of apprentices and "learners" is materially below the pre-war average. Among other and more permanent causes tending to affect the proportion in one direction or another may be noted (1) the effect of the declining birth-rate on the number of boys leaving school and available for employment, an effect which will have increasing

importance in the near future, (2) the tendency in large-scale industries, in varying degrees, towards a more and more minute subdivision of employments, with a consequent decline in the proportion borne by all-round skilled craftsmen to semi-skilled or unskilled workers, or at least to those whose skill is limited to particular processes. There is also to be mentioned the policy of certain trade unions in restricting the proportion of apprentices to journeymen, but, generally speaking, the evidence before us does not suggest that such restrictive action has increased in importance in recent years. More important is the unwillingness of parents (stimulated perhaps by the high cost of living) to forego the higher wages which their boys can earn in occupations which have no prospects of permanent employment. It is stated in the Memorandum, however, that, in general, employers during recent years have had little difficulty in obtaining the number of apprentices which they required.

Confining attention to the apprentices and "learners" who enter industry every year, we have next to note what are the existing arrangements for their training, and how far they are permitted and encouraged to continue their education and supplement the deficiencies of workshop training by part-time classes either of a general or "vocational" character.

The most usual method of training an apprentice in the workshop is to put him under the care of a journeyman or, somewhat less frequently, of a foreman or, in smaller establishments, of the employer himself. More rarely the training of boys is undertaken by persons specially employed for the purpose. Where welfare supervisors have been appointed it is not uncommon for them to exercise some supervision over workshop training.

An indication that existing methods of workshop training are not generally regarded as fully adequate is afforded by the fact that a substantial number of employers are evidently alive to the desirability of supplementing it by technical classes. The Memorandum states that an appreciable proportion of employers give positive encouragement in various ways, e.g., by paying class fees or allowing time off; some give prizes, and a small percentage of firms, mainly in the printing trades, make attendance at classes compulsory. Others give preference to youths who have been technically trained. Facilities for instruction of some kind seem fairly well spread, but it appears that only a minority of apprentices and learners use these facilities. This is no doubt partly attributable to the natural reluctance of boys to go to evening classes after a fatiguing day's work, partly to the competition of other attractions, possibly, in some cases, to the unsuitability of the instruction provided. Several witnesses who gave evidence before us referred with regret to the failure of their efforts to induce apprentices to attend classes regularly. If more widespread provision could be made for allowing time off for the purpose of such attendance some of these difficulties might be lessened.

School Education.

We pass now to the consideration of the present position regarded from another point of view, viz., the provision of special educational facilities of all kinds suitable to the needs of those who expect to be employed in trade and industry, or who are already engaged therein.

For the purpose of this survey there is no need to confine attention to industrial as distinct from commercial employments, and the information available includes girls as well as boys, and relates to the preparation for higher as well as lower grades of employment. The Memoranda on pages 160–255 give a survey of the existing provision for education in Great Britain, both in publicly controlled or aided schools and classes and in the Universities, so far as it has the definite aim of preparing for industrial and commercial life. In restricting our examination to this particular aspect of education it must not be thought that we ignore or under-value the wider aims and functions of education as a preparation for life, or suggest that they ought to be sacrificed or subordinated to the demands of industry and commerce. But evidently an examination of the whole field of education is beyond the scope and competence of the present inquiry, which is only concerned with education as an element in increasing the efficiency and competitive power of industry and trade.

It appears that about 650,000 boys and girls annually leave public elementary and primary schools in Great Britain at or about the age of 14,* and the great majority of these pass or endeavour to pass directly into employment of some kind, including, in the case of girls, domestic employment at home. At least 100,000 boys and girls leave secondary and higher schools every year, of whom the majority, perhaps two-thirds, came originally from elementary schools.† Since a large proportion of the pupils of secondary and higher schools are either absorbed by the higher industrial and commercial posts or enter professions, or (especially in the case of girls) do not take up paid work, it is clear that the great bulk of ordinary workshop vacancies are recruited from the elementary schools, either directly or after some intermediate period occupied by transitory work.

The question how far the methods and organisation of the public system of education are well adapted or can be better adapted to the needs of industry and trade is now being examined by two committees presided over by Mr. D. O. Malcolm and Lord Salvesen.‡ We

* See table, p. 174. See also tables on p. 150–1.

† Many of these entered secondary schools below the age of 14, and hence are not included in the total of 650,000.

‡ The terms of reference to the committees are to inquire into and advise on the public system of education in relation to trade and industry, with particular reference to the adequacy of the arrangements for enabling young persons to enter into and retain suitable employment. The one committee is dealing with England and Wales, and the other with Scotland.

have consequently abstained from making special inquiries of our own on this subject, though it has been referred to from time to time by some of the witnesses who have given evidence. No evidence, however, has been submitted to us by representatives of trade and industry which suggests that they either expect or desire that specialised preparation for particular occupations should form part of the ordinary curriculum of elementary schools. There is frank recognition of the fact that the great bulk of the teaching given to boys and girls under the age of 14 must necessarily aim at equipping them with the fundamental elements and instruments of knowledge, both for their direct value in daily life and also as "key" subjects affording the indispensable means of access to further knowledge and attainment. No opinion has been expressed to us that this essential aim should in any degree be sacrificed to the illusory attempt to give "vocational" training to young children. On the contrary, more than one witness has expressed apprehension lest the overloading of school time-tables with special subjects may be impairing the thoroughness with which the children are grounded in a few essential subjects.

Technical Education.

The Memorandum on page 160 gives a picture of the provision made in Great Britain for technical education, together with a sketch of its historical development. It is evident that in this matter the requirements of different trades vary very widely and require separate study, so that no short summary of the detailed information contained in the Memorandum would serve any useful purpose. Broadly speaking, however, it will be seen that the contribution made by technical schools and colleges to preparation for industrial life takes three forms, (*a*) junior and senior full-time day schools for students mostly between the ages of 14 and 18, (*b*) part-time classes and courses (mostly in the evening) for students of all ages from 14 upwards, and (*c*) classes and courses in higher technical institutions or colleges of University rank for students of 17 or 18 and upwards.

(*a*) The number of boys and girls in England and Wales attending full-time junior technical schools, including pre-apprenticeship schools, before entering employment is about 12,000, and, assuming an average attendance of rather over two years, this would involve an annual intake of about 5,000.

(*b*) By far the greater number of ex-elementary school pupils who continue their education do so by means of part-time classes held mostly in the evening. At present there are over 4,000 evening schools (including the evening departments of technical schools) in England and Wales, attended by 680,000 pupils. These figures cover not only technical, but continuation, commercial, domestic and other kinds of instruction, and no separate statistics are available as to the number of students studying technical subjects. It is estimated that 25 per cent. of boys and 22 per cent. of girls who leave

elementary schools without passing on to any other full-time school enter an evening continuation school. A substantial proportion of the pupils, especially among the girls, probably do not stay more than one year in the classes*, and the average attendance is only between 80 and 90 hours in the year.† In Scotland, the total number of students attending evening continuation classes or courses in 1924–25 was 142,538, of whom it is estimated that about 35,000 were studying subjects specifically described as technological. There were also about 9,000 evening students in technical colleges.

(*c*) The intake of the universities and university colleges in Great Britain in 1924–25 was approximately 12,000, about 9,750 in England and Wales and 2,350 in Scotland‡. This includes only full-time students entering for first degree or first diploma courses. Over one-sixth of the total number of full-time students in these institutions (nearly 42,000) were enrolled in 1924–25, in faculties of pure science, and about one-tenth in technological faculties. Out of the 4,205 students of technology, over 3,000 were studying engineering, 140 metallurgy, 280 applied chemistry, and 275 mining. As regards full-time instruction in higher technical institutions, the annual intake into senior technical courses in England and Wales appears to be about 1,500 ; and into technical colleges in Scotland possibly about 600.

It is evident that the full-time junior schools in preparation for industry, while of great value especially in relation to certain trades, have at present only a limited scope in relation to industry as a whole, and do not make more than a partial contribution towards solving the problem indicated above of filling the gap between the age of leaving school and entering skilled employment. The part-time classes for young people already in employment cover a very much wider area. It is gratifying to note that an increasing number of employers recognise the utility of these classes, and it is earnestly to be desired that employers generally should see the necessity of giving them such active encouragement as would induce apprentices to attend and enable them to obtain full value from these classes.

So far as can be judged, the chief need at present is not merely to expand the scope and increase the number of technical classes, but to ensure the better adjustment of their relations with industry ; and this can only be done by developing the co-operation between leaders of industry and educational authorities, and by thus heightening their interest in the work and increasing their feeling of responsibility therefor.

It is clear that there is constant need to adjust the relations of technical instruction to general education on the one hand and to industrial conditions on the other. While the former relations

* In a well organised Yorkshire County Borough the proportion who stayed more than one year was 60 per cent. Probably for the whole of England and Wales the percentage would be a good deal lower.

† In Scotland, the average is between 60 and 70 hours.

‡ *See* footnote, p. 162.

have long been the subject of anxious and continuous care and thought on the part of those responsible for our educational system, the relations between technical instruction and workshop life require in an increasing degree the systematic attention of the organisers of industry. This matter is the more important because the changing forms of organisation and mechanical equipment and the sub-division of occupations which characterise some of the more important industries are continually modifying the nature and extent of their educational needs, and these changed conditions of demand can only be fully known to those actually engaged in industry.

Of the remaining type of technical education, viz., the higher scientific and technical instruction given in the Universities or in institutions of corresponding rank, it may be said that, generally speaking, the training they supply is of a more scientific character than that which is acquired in practical industry, and in so far as such qualifications are indispensable to modern industry they can only be obtained through institutions of this kind. Such differences of opinion as exist relate mostly to such questions as the proper age at which technically and scientifically trained youths should enter the higher industrial posts, and the degree of preference which should be accorded to them in virtue of such training.

Commercial Education.

Side by side with this provision for technical instruction are found a large number of graduated schools, classes and courses of instruction which aim specifically at preparing for commercial life, including both the distributive branches of trade and the mercantile and administrative sides of industry. The provision for this purpose in Great Britain is described in the Memoranda on pages 219–255. It falls, broadly, under two main heads, corresponding to two distinct lines of development of modern commercial organisation. In the first place, commercial office practice has been revolutionised by the introduction of such devices as typewriting and shorthand, the knowledge of which cannot be effectively acquired within the office; and there has been a very large and constant demand for schools and classes teaching these and other "office arts" (e.g. book-keeping) which can be most conveniently learned in classes. This type of instruction, together with the pursuit of modern languages, accounts for the great majority of students included in the statistics of commercial education.

Meanwhile, there has been another important development of commercial requirements of quite a different order and only affecting the higher branches of commercial education. The growing complexity and inter-connection of modern economic conditions and relations often tend to make the commercial success of any undertaking dependent on a number of elements beyond its control and only partially within its knowledge. In these circumstances, sound

judgment depends more and more on the power of readily appreciating the effect of new combinations of conditions; and such power cannot always be obtained through practical office experience without the aid of previous systematic training in economic and financial principles. This is the justification of such higher commercial education as is given in some of the British Universities (see pages 233–245 and 255), or of the more extensive and ambitious arrangements for this purpose made in Germany and the United States.* The present response of the commercial world, in this country at least, to the educational efforts made to meet its higher requirements can at best be regarded as imperfect and uncertain, and the stability and effectiveness of these efforts are endangered by the fact that there is as yet no sufficient assured demand for the results of the training. One considerable difficulty, not yet fully overcome, is the age of University graduates, which is considerably in excess of the age at which most commercial undertakings have been accustomed to recruit their staff. The fact, however, that the demand for higher commercial teaching of University rank has emanated rather from economists and educational observers than from the representatives of commerce does not substantially weaken the case for such education, for almost exactly the same observation could have been made a generation ago with regard to forms of technical and scientific instruction which have now become firmly established.

Among other unsettled questions affecting commercial education on which there is difference of opinion among competent authorities is the relative place in such education (especially in its higher branches) which should be occupied by specialised instruction in business technique and procedure as compared with the general economic principles underlying commercial operations. Another allied problem is the relative value of unspecialised secondary education up to the age of 18 as a preparation for commercial life as compared with a specialised course of commercial study during the last two years.

The number of pupils in full-time junior commercial schools in England and Wales in 1924–25 was rather less than 4,000, of whom the majority were girls. As regards evening classes, the available statistics do not show how many of the 680,000 pupils of such classes in England and Wales were studying commercial subjects. In Scotland, the estimated number of students taking evening continuation classes or courses in commercial subjects (including modern languages) was about 40,000 in 1924–25, and there were also about 2,000 evening students taking commercial subjects in central institutions. In the universities of Great Britain, the number of students in faculties of commerce (including part-time students) was probably well under 1,000. Senior full-time commercial courses in other institutions in England and Wales were attended by about 550 students (the majority females), and the number of full-time students of commercial subjects in central institutions in Scotland was under 200.

* See pages 260–1.

Need for further co-operation.

It will be seen from the above brief review of the situation in respect both of technical and commercial education that the process of co-ordination between the educational facilities provided and the ascertained needs of industry and commerce is in several respects imperfect. When we come to review the present position of industrial art it will be found that there also the outstanding problem is one of better adjustment. Without, therefore, entering into any controversy on the merits of the questions raised, we desire to call particular attention to the view expressed on page 186 of the Memorandum of the Board of Education as to the urgent present need of the establishment by each important industry of machinery by which it may examine and formulate its own requirements with regard to industrial training, and co-operate with the educational authorities in ensuring that these requirements are suitably met. The value of co-operation between industry and education is likewise emphasised in the Memorandum of the Scottish Education Department on page 190. Substantially the same conclusion is arrived at by the British Institute of Industrial Art (page 350); and a somewhat similar inference may be drawn from the replies of the Universities to the Committee's enquiry on the subject of Commercial Education (pages 233–245).

We are fully aware that in certain areas and trades a considerable amount of active co-operation already exists between representatives of education and of industry and commerce; and we are glad to believe that this co-operation is increasing in extent and strength. We also recognise the valuable efforts made in this direction by a number of Joint Industrial Councils and certain Chambers of Commerce. But partial and local efforts of this kind, excellent and useful as they are, cannot cover the ground. What is needed is that each great industry should make its own educational needs the subject of thorough and systematic examination, for until this is done the indispensable conditions are wanting for the right solution of the outstanding problems.

Choice of Employment.

Increasing attention has been paid in recent years to the possibility of increasing industrial efficiency by better and more scientific methods of recruitment and selection, so as to ensure that the flow of entrants of different aptitudes may so far as practicable be directed to occupations for which they are fitted. Obviously, if by any preliminary steps applicants for work can to some extent be sifted and sorted before entering employment, a good deal of waste of power may be saved.

The problem may be approached from two points of view: (1) the advising of boys and girls leaving school as to their future occupation, and (2) the testing of applicants for employment before assigning them to particular jobs.

The Memorandum on page 262 gives an account of the official arrangements in Great Britain for advising boys and girls and helping them to obtain employment. These arrangements differ in different areas, as Local Education Authorities have an option either to undertake the work or to leave it to the Ministry of Labour, operating through the Employment Exchanges. At present about three-fifths of the youthful population of Great Britain are in areas in which the Ministry of Labour take responsibility for this work, and about two-fifths in areas in which the Local Education Authorities exercise their "choice of employment" powers. Local committees are constituted in each area, either as special committees of the Education Authority or as advisory bodies attached to the Juvenile Departments of the Employment Exchanges; and the giving of advice as to choice of employment is an important function of these Committees. This advice is, so far as practicable, followed up by the Juvenile Departments of the Exchanges, or by After-Care Committees, but no comprehensive statistics are available showing the number of juveniles who seek or who follow the guidance of these bodies, or the success or failure of the advice given.*

The testing of boys and girls with a view of discovering their "vocational" aptitudes in relation to the ascertained requirements of specific occupations is now being made the subject of an experiment carried on in co-operation with the Ministry of Labour by the National Institute of Industrial Psychology, a body established for the systematic study of the psychological factors in industrial efficiency.† It is still too early to draw any definite conclusions either as to the validity or the utility of these tests, but the evidence submitted to us shows that methods of selection and recruitment may, especially in certain occupations, have an important bearing on industrial costs.

STANDARDISATION.

The important question of standardisation is dealt with in Chapter III. As is there indicated, this term is currently used in two wholly different senses which need to be carefully distinguished:—(1) the prescription by law, and the supervision and enforcement by legally constituted authorities, of the elementary standard units of length, volume, weight, value and energy on which industrial and trade operations on a modern scale depend for their security, together with such other standards of purity, strength or quality as it may be considered necessary to enforce in order to protect the health, safety and well-being of the people; (2) the voluntary determination by industries, either individually or in agreement, of standards of size, shape, weight, strength or other qualities with a view to attaining some measure of uniformity in

* The arrangements are fully described and discussed in the first report of the Malcolm Committee (see third footnote, p. 23), dated November, 1926.

† See note on page 264.

order to eliminate the waste caused by the unnecessary multiplication of different patterns, etc., and to ensure the interchangeability of parts. British industry and trade are deeply interested in both these kinds of standardisation, but the interest is of a wholly different nature in the two cases.

Standard units and other compulsory standards.

The fixing and enforcement of standards of fundamental units such as length, volume, weight, time, value, etc., is universally regarded as one of the elementary functions of all civilised governments, and it is evident that, unless they discharge this function with efficiency, modern industry and trade would suffer grave prejudice. The organisation and methods by which these duties are performed in Great Britain are fully described in the Memorandum referred to, and it need only be added that, with the two exceptions noted below, neither the suitability of the units fixed, nor the mode and efficiency of their supervision, have been the subject of any serious criticism.

As is well known, the Imperial standards, though (with slight variations) common to English-speaking countries, differ radically from those of the metric system, which is very widely used on the Continent and elsewhere. There is a certain body of opinion in this country (represented by the Decimal Association) which is strongly in favour of assimilating British practice with that prevailing in so many overseas countries. This is urged on three grounds—(1) the inherent superiority of the metric system, and especially the simplicity and ease of calculation resulting from its decimal basis and the direct relationship between its units of length, volume, and weight ; (2) the competitive advantage, for a country so greatly dependent on foreign trade, of basing its production and commerce on units familiar to the foreign countries with which its trade is carried on ; (3) the belief that the adoption by Great Britain of the metric units would be followed by similar action on the part of other English-speaking countries and thus lead to general international uniformity in weights and measures.

Without questioning the importance of this matter, the Committee felt that, in view of its highly special and technical character and of the fact that it had been repeatedly examined and reported on by other committees in recent times,* it was unnecessary for them to take the initiative in investigating afresh the relative merits of the British and metric systems unless they should be moved to do so by witnesses speaking on behalf of the great trades and industries. As a matter of fact, little interest was shown in the question by the trade witnesses who came before us, the most notable exception being the representatives of the cotton trade, which, for special reasons connected with its system of " counts " and of wages calculations, is strongly opposed to any change in the existing system.

* For details see Annex 2 to the Memorandum on Standardisation, page 283.

As regards the second ground on which the adoption of the metric system is advocated, viz., the advantage of uniformity of units as between this country and those with which its overseas trade is carried on, it has been thought desirable to obtain statistics showing the proportions of British export trade which at present go to "British standard" countries and "metric" countries respectively, with the corresponding proportions before the war. The result is given in the table on page 283, which shows that the proportions of our export trade going to "metric" and "British standard" countries respectively are approximately equal, and that, as compared with the period immediately preceding the war, the proportion going to "British standard" countries has somewhat increased. Thus the percentage of our exports which went to metric countries declined from 47·3 in 1913 to 45·6 in 1925, whereas the percentage to "British standard" countries rose from 42·7 to 49·8.* These figures must not be interpreted as meaning that the British system has spread in the interval at the expense of the metric system. On the whole the tendency has been the other way, for several countries, including those formerly comprised in the Russian Empire, and Greece, have adopted the metric system in their trade returns since 1913. What the statistics do indicate is that there has been some shift of British trade, doubtless connected with the operation of Imperial Preference, towards countries using British weights and measures, and also that the Irish Free State (which uses the Imperial standards) has become an external market for the purpose of trade returns. The inference from the figures is, however, plain, viz. that the adoption of the metric system by Great Britain alone, unless followed by similar action on the part of the rest of the English-speaking world, would lead to a contraction rather than an extension of the area of British export trade which would benefit by uniformity.

The only other question of standards on which we have heard of any practical suggestion for change is that of time. Besides the controversy on the merits and details of "Summer time," there is an appreciable movement on the part of commercial opinion in favour of fixing the date of Easter and thus eliminating the inconvenience to trade arising from the irregular variations of the dates on which business is interrupted by the Easter and Whitsuntide holidays. While the fixing of Easter cannot be said to be a matter of prime importance to the business community, it would be an undoubted convenience to trade, provided that the change were generally made. But this clearly could not be effected except by international action, which again is dependent on the concurrence of the principal organised Churches. We are therefore glad to know that the matter is being systematically studied by a Committee of the League of Nations on which the Churches are represented.

* The residual percentages represent the trade to countries with systems other than metric or British.

On pages 271–2 reference is made to certain important measures in force in Great Britain for the legal fixing and enforcement of standards of purity, quality, etc., mainly, though not exclusively, in the interests of public health and safety. This is not a matter which has come prominently before us in evidence, partly perhaps because the food, and other industries which are chiefly affected by hygienic measures are not among those which we have selected for special examination. Certain criticisms were offered by shipowners as to the stringency of some of the standards of safety fixed by the Board of Trade in the matter of shipping, but the points raised were too special and technical to be usefully discussed in this introduction beyond a general expression of hope that the more widespread adoption of safety rules by foreign shipowners may eventually lessen or remove any handicap at present imposed on British shipping.

Voluntary Standardisation.

We pass, therefore, to the consideration of industrial standardisation in the second sense of the term, viz., the voluntary fixing of standards of size, pattern, quality, etc., by the representatives of the industries concerned, with the object of limiting the variety of types in use, and by this means eliminating waste of effort, capital and material, and so reducing the costs of production and distribution. It will be evident that the mere legal fixing and enforcement of fundamental and secondary standard units, though an indispensable condition of industrial standardisation, does not of itself tend to reduce the variety of types in use. Nor does the legal fixing of standard requirements of purity and quality have more than an indirect effect in this direction. No doubt, for example, the pharmacopoeia has some tendency to restrict the variety of drugs and prescriptions, but, generally speaking, legal standards of purity and quality are minimum requirements, from which unlimited variation is allowed in an upward direction. In order to ensure an effective reduction of the variety of types, and thus to realise the economy which is the object of industrial standardisation, something more than this is needed, viz., agreement to adhere to definite standard specifications from which deviation in neither direction is permissible.

The growth of the modern system of production by elaborate machinery in large-scale undertakings tends powerfully to encourage standardisation, by familiarising manufacturers and consumers with the economy and consequent cheapness resulting from the mass production of articles of uniform type. But while mass production is an essential pre-requisite for standardisation, the specific economies resulting from standardisation are quite distinct from those arising from large-scale industry, nor are its benefits by any means applicable to all such industries to an equal degree.

A distinction is sometimes drawn between "standardisation" applied to manufacturing processes and "simplification" applied to finished articles, but the aims of both are identical, viz., the elimination of waste caused by the unnecessary multiplication of sizes and patterns. A good example of "simplification" is afforded by the action recently taken by H.M. Stationery Office and by the organisations of master printers and wholesale stationers for prescribing the units by which paper is sold. For example, the seven varieties of the "ream" were reduced to one, and the sizes of paper termed "foolscap," "demy," etc., were definitely fixed.

By far the most important work in connection with voluntary standardisation is that done by the British Engineering Standards Association, whose constitution and achievements are described in the Memorandum on page 288. In spite of its title the Association deals with certain kinds of materials and products not usually classified as engineering, e.g., building material, petroleum products, etc. It has issued a large number of standard specifications, and the scale of its operations can be judged by the fact that there are 420 committees, sub-committees and panel committees engaged in the work.

The advantages of standardisation in reducing industrial costs and stimulating foreign trade are many and important. The decrease in number of types reduces the number of interruptions in production due to changing over from one size or design to another. The assembling and replacement of parts are greatly simplified by interchangeability. The fixing of standard types makes economically possible the installation of labour-saving devices, and encourages continuity of production by making it safer to manufacture to stock. It also diminishes the capital locked up in plant, gauges, tools and materials, and it materially reduces the cost of distribution by decreasing the stocks of different patterns which the distributor requires to hold. Effective standardisation also tends to simplify the task of the consumer (especially overseas) in placing orders and comparing tenders, and it guarantees to him the advantages of interchangeable parts without limiting him to the products of any individual manufacturer.

These are very substantial advantages, some of which are illustrated by concrete cases in the Memorandum. For example, as a result of standardising tram rails it is now only necessary to roll four different sections instead of seventy-five. The reduction of the many hundreds of iron and steel sections to a total of 113 has, it is claimed, reduced the cost of rolling the sections by an average of 5*s.* per ton, a saving of about £1,000,000 a year. An illustration given of waste through failure to standardise is that of pit tub wheels, of which one firm is stated to have 3,000 patterns in stock, whereas in their opinion some 50 would meet the needs of the whole country.

Another advantage claimed for standardisation is that the propagation of British standards may facilitate the penetration of British manufactures into overseas markets. For example, the British electrical manufacturers consider that the propagation of British standards for electrical machinery is vital to their export trade, since only by this means could they be released from the necessity of tendering in accordance with foreign standards which forced them to provide for the manufacture of machines differing from established British practice, with consequent waste and increase of cost. Another example is the standard specification for Portland cement, which has undoubtedly strengthened British competitive power. Other examples are given in the Memorandum.

On the other hand, there are certain dangers in over-standardisation which deserve careful consideration. Briefly stated the dangers are (1) that standardisation may crystallise existing practice and ultimately retard development, and (2) that it may be carried to a point incompatible with the maintenance of high quality and artistic excellence, and inconsistent with a sound export policy based on the power of ready adaptation to meet the local needs and tastes of different markets.

The first of these dangers is perhaps on the whole the more formidable, and cases might easily arise (even if they have not already occurred) in which the representatives of a branch of trade, having obtained a valuable standard specification, oppose with energy the establishment of a standard for some variant, the competition of which would, they fear, be prejudicial to their interest. If this kind of sectional obstruction were allowed to prevail, standardisation must in the long run be a clog to progress, and if it is to be overcome it is essential that the standardising authority should be strong and independent, and not at the mercy of any sectional interest which may withdraw its financial support.

The second danger, viz., that over-standardisation may threaten the quality and adaptability of products, is one that needs to be very carefully borne in mind by any standardising authority. The special importance of this consideration to British overseas trade lies in the fact that, as may be inferred from the "Survey of Overseas Markets," already published, the strength of British competitive power in many important branches of trade lies in the high reputation of British products for quality, and the prospect of their holding their own in future depends largely on the power of intelligent adaptation to changes of demand. It appears from that Survey that the widespread growth of local manufacture in countries which in the past have been the customers of this country is likely to have a tendency to limit international trade in certain branches to the higher qualities or special kinds of goods which cannot be locally produced. So far as this is the case, future international competition will more and more turn on quality in the broad sense of the term,

and it is, therefore, vital to the interests of British trade that nothing should be done to impair either the reputation of British goods for quality or the power of British manufacturers and traders to adapt their goods readily to local needs and changes. This warning is chiefly applicable to the future, for at the present stage the careful work performed by such bodies as the Engineering Standards Association cannot be regarded as offering any immediate menace either to the adaptability or quality of British production.

The more urgent and obvious danger is in the opposite direction, and arises rather from the inertia of the trades concerned, and their passive resistance to changes of customary practice, than from any likelihood of the too rapid and indiscriminate adoption of standardised methods. The conservative instinct, which for good and ill is so powerful in British industry, may at least be relied on to check the rash acceptance of any curtailment of variety of types which is calculated to impair competitive power.

Nor is the elimination of the useless multiplication of types and patterns necessarily prejudicial to quality and artistic excellence, provided that the reduction of variety is carried out with wisdom and discretion. The restraint resulting from the limitation of types is often more conducive to beauty than the exuberance arising from unfettered freedom of choice.

The progress of standardisation, which, as already seen, is intimately bound up with the growth of large-scale production, has by no means been confined to Great Britain. Some account of foreign progress in standardisation will be found in Annex 3 of the Memorandum on Standardisation (page 285) from which it will be gathered that the only countries in which the advance has been comparable with that in Great Britain are the United States and Germany. In the United States several organisations are interested in standard specifications, and, in addition, the Department of Commerce has a Division of Simplified Practice (within the Bureau of Standards) which takes an active part by various means, including conferences with the trades, in promoting the elimination of wasteful multiplication of types. The procedure followed by this organisation and the results achieved since its establishment in 1922 are described in the Memorandum on the Simplification Movement in the United States on page 299. The report of the Department of Commerce for 1925 states that over fifty simplifications have been achieved by the industries and trades since the service was established, of which 25 were in the metal industries and 17 in clay, cement, glass, etc. In these cases the varieties of types have been reduced on an average by nearly three-quarters, yielding a very notable saving of costs. It should, however, be remembered that America with its immense resources has always been pre-eminently the country of industrial waste, so that it would be unreasonable to expect savings on a similar scale to result from similar procedure in Great Britain.

In Germany, it is stated on page 287, that "manufacturers, probably because of their technical training, appear to take far more interest in industrial standardisation than the generality of firms in this country." This statement gives food for serious thought. It is certain that if industrial standardisation is to yield its full benefits to the economy of British industry, while avoiding the dangers incidental thereto, a much more alert and responsive interest needs to be awakened in the subject on the part of the principal trades concerned. Without such continuous interest and support all the efforts whether of Government or of voluntary organisations will fail to produce their due effect. The German experience, moreover, is highly suggestive as to the close connection between the higher technical training of manufacturers and their attitude towards problems of industry like standardisation which lie a little outside their ordinary groove.

It is not, however, only in the industries directly concerned that difficulties of obstruction and conservative resistance are encountered. Standards framed after the fullest consultation with users have sometimes failed to secure wide adoption as the basis of specifications or tenders, owing to the reluctance of buyers and consulting engineers to depart from established practice. Standardisation can only make permanent progress if users realise that it presents advantages to them as well as to manufacturers. A good deal has been recently said of the advantage of international standards, and the subject is evidently worthy of further exploration, though the advocates of so-called international standards often really mean the adoption of their own established national standards by other countries—a very different proposition. There is, however, a definite and welcome movement within the British Empire to secure a greater degree of co-operation and uniformity in the fixing and adoption of industrial standards. (See Memorandum on Standardisation, pages 280 and 287–8.)

On the whole the British movement towards standardisation is hopeful and encouraging, and it is greatly to be desired that its scope and utility may be further increased by such public support as may be necessary to guarantee the independence of the standardising authority, without in any degree impairing its autonomy or its close co-operation with the industries affected.

SCIENTIFIC RESEARCH.

It is a commonplace that the operations of modern industry tend more and more to be based on scientific knowledge, and it follows that one essential factor in industrial efficiency is the continuous and systematic application of scientific methods both to the invention and improvement of particular methods and processes of production and to the enlargement of the boundaries of knowledge with regard to fundamental underlying principles. These tendencies and their

gradual though still very imperfect recognition by the industries concerned has led to the growing demand for scientifically trained experts, which the Universities and other institutions of higher education are now endeavouring to supply.

The greater part of the services of the chemists and other scientific experts employed in industrial establishments is absorbed either by routine testing or by what has been aptly termed by one of our witnesses "tactical research," e.g., the discovery of methods of obtaining improved results from some given process. In the laboratories of individual undertakings a smaller amount of attention is paid to "strategical research," i.e., the search for new products or processes, or to the investigation of fundamental laws. Research work of the last-mentioned order, though, if a long view be taken, it may be of immeasurable importance to an industry as a whole, is usually beyond the financial means and often beyond the range of imagination of a single firm or company; and, moreover, an individual may well shrink from incurring the entire expense of a protracted research from which there is no certainty that his own business will derive any direct and immediate profit, and the ultimate benefit of which, if successful, will accrue to the entire industry.

In some other countries, e.g., the United States and Germany, a very great amount of research has been carried out by industrial associations, corporations and combinations and even by large individual concerns. The memorandum, on page 318, quotes estimates that the amount spent annually in the United States on industrial research is 75 million dollars, and that the sum annually spent by the American manufacturers in laboratory research alone amounts to 35 million dollars. In Germany the combination of chemical and dye manufacturers employs hundreds of chemists on pure research work. Many other examples of foreign research in private laboratories are given in the memorandum, but no similar particulars are available from official sources with regard to Great Britain. The evidence before the Committee showed that a considerable amount of research is carried on by large undertakings, e.g., the British Dyestuffs Corporation, but as already stated only a small proportion of this work is concerned with fundamental investigations.

The memorandum on State assistance to research in industry on page 305 describes in detail the measures adopted by the British Government for the encouragement of scientific and industrial research of a kind beyond the means of single firms. Broadly speaking, the two main methods adopted are—

(1) the maintenance of central laboratories and research stations controlled and financed by the State for the elucidation of fundamental problems of general industrial interest, e.g., the National Physical Laboratory, the Chemical Research Laboratory recently established, the Fuel Research Station, and the organisations for research into such subjects as food, building and forest products;

(2) the promotion of Research Associations, i.e. co-operative organisations for scientific research in connection with particular industries, organised by the industries themselves in accordance with a general scheme, and financed at the outset partly by the industry concerned and partly by the State.

The original idea was that the State grant to Research Associations should be limited to five years, during which period it was expected that the research schemes would so far establish their utility to the industries that those industries would in future be willing to bear the whole expense. The memorandum shows that 26 Research Associations were formed under the Government Scheme, covering a large section, though far from the whole area, of British industry to which research is applicable. Moreover, within the industries so covered there are great variations in the degree to which the Research Associations are fully representative. One of the largest and most representative of all the Associations is the Cotton Industry Research Association, which represents more than 85 per cent. of the capital employed in the cotton trade. In some other cases only a minority of the trade has taken a direct interest in the Association.

The results so far achieved by the Research Associations as a whole, while promising for the future and amply justifying the establishment of the Associations, have been for the most part rather of an educational value to the industries concerned than of a kind which can be assessed in terms of actual monetary saving or gain. It is evident that the initial period of five years, which has in most cases now expired, has been very largely occupied by preliminary organisation and the exploration of the field, and by tentative and experimental essays which have not yet borne full fruit. It has in fact proved too short a period in the case of most of the Associations to yield practical results sufficiently clear and striking to convince the sceptics within the industry of the money value to their businesses of fundamental scientific research. It is satisfactory to learn that His Majesty's Government has recognised the inadequacy of the initial period and has extended its grants on a diminishing scale for a further term in the case of most of the Associations.

It must not of course be thought that no definitely measurable results have been attained. On the contrary, the memorandum gives on pages 321–2 several instances in which industries have already benefited directly from the work of Research Associations. But it must be admitted that these Associations have not yet in all cases struck deep root, and the experimental stage has not yet been safely passed.

In the evidence taken by our Committee certain partial explanations were offered by trade representatives of the comparatively slow progress made in respect of scientific research generally, as

compared with some of our foreign competitors, notably the exceptional economic difficulties of the period since the war, and the apathy and indifference towards science which are still far too common in British industry. As the representative of an important industry put it, "the difficulty is to finance it (i.e. research) over the interval that elapses between incurring expenditure and producing results that the rank and file will recognise."

While it must be recognised that the public interest necessitates an effective control to ensure that Government grants are properly spent, it is the case that freedom and flexibility are essential conditions of fruitful research. It is possible that a solution of the problem of co-operation may be found in a development of the tendency already discernible towards a demarcation of functions between the State and private enterprise in the matter of research, rather than in a continuance of their present temporary partnership. The main direction of the line of demarcation is in fact already disclosing itself, though it is not always very clearly marked, viz., between research mainly directed to the improvement or invention of industrial processes, which is the prime business of individual enterprises either singly or in co-operation, and research principally concerned with fundamental scientific problems underlying industry, for which already the State is assuming a certain degree of special responsibility.

INDUSTRIAL ART.

From the question of scientific research in relation to industry, we pass naturally to the requirements of modern manufacture in respect of art. If it be true that science is more and more recognised as the indispensable foundation of modern industrial processes, it is no less certain that the development of the great machine industry, with its sub-division of employments and mass production, had, at the outset, a most disturbing and often disastrous effect on industrial art by breaking up the old craft traditions, revolutionising technique, and severing or weakening the close relations which previously existed between designer and executant. The difficult problems of art and design which emerged from the chaotic conditions thus created have hardly yet been fully faced or satisfactorily solved. If, as was indicated in our "Survey of Overseas Markets," success in international competition is likely to depend more and more on quality of output, it is evident that the right solution of these problems is likely to be a matter of increasing importance to the maintenance of the position of British trade.

The present situation with regard to industrial art is set out in a memorandum on page 335, prepared, at the request of the Committee, by the British Institute of Industrial Art—an organisation constituted after the war, under the joint auspices of the Board of Trade and Board of Education, to foster a high standard of design and quality

of workmanship in British trade. The memorandum is mainly concerned with surveying the existing position of certain groups of trades selected as being especially dependent on design, viz., textiles, furniture, pottery and glassware, metal-work and jewellery, books and printing. It deals primarily with the conditions of manufacturing industry as distinct from the work of the artist craftsman, though it is fully recognised that the two sides of the problem are closely inter-related. As the Memorandum observes, "the artist-craftsman is at once the repository of what remains of our ancient craft traditions and the pioneer explorer of the possibilities of new forms, methods and materials." In spite, therefore, of the differences of method, the disappearance of the artist-craftsman "would inevitably manifest itself in a progressive degeneration and impoverishment of industrial design."

Among the matters dealt with in the Memorandum are the sources from which designs are obtained, the training and functions of designers, the adaptation of designs to the technical conditions of industry, and the special problems due to the modern separation of the designer from the other factors in production and distribution. Evidently these are all matters which can only be profitably considered in connexion with the particular trades, and do not lend themselves to a brief summary.

Broadly speaking, it is found that the demand of modern industry for new designs varies very widely from trade to trade, and is generally greatest in proportion to output in the case of products whose life is shortest (e.g. women's dress fabrics) and least in the case of long-lived articles like furniture and metal-work. Moreover, the tendency of large-scale production is to diminish the proportion borne by the volume of demand for new designs to that of output, while, on the other hand, the technical conditions to be fulfilled by designers become more exacting. Special attention is called to the marked dependence of some branches of the textile and other industries on foreign designs, which has been made possible by the modern tendency to a wide separation between designer and producer. It is made clear that there is pressing need for closer contact and co-ordination between the authorities concerned with schools of art and the representatives of industries dependent on design, with a view to discovering and removing any obstacles which impede full co-operation. Similar action is necessary to secure that the functions of art museums, especially local museums, in relation to the training of designers may be better defined and more adequately fulfilled.

It may be added that the need for further examination and research in regard to these and other factors in the healthy functioning of British industrial art was clearly shown by the experience of the International Exhibition of Decorative and Industrial Art, held in Paris in 1925, on which we understand that a special report is about to be published.

The final lesson to be learned is the need of better mutual adjustment and further co-operative research, and until this need is more fully realised and met, it is inevitable that much costly effort will continue to be misdirected and comparatively barren of results. Should the sole result of such adjustment and research be to save part of this waste, and to improve somewhat the quality of production, its cost would be amply repaid. If in addition they should lead, as may not unreasonably be hoped, to a diminution of the present dependence of important branches of British industry on foreign design, and to the fostering of a characteristic national style worthy both of the fine past traditions of this country and of the undoubted technical excellence of its modern manufactures, the result would be to create a new and valuable asset for British industry and an additional attraction to overseas buyers.

STATE MEASURES FOR MEETING POST-WAR DIFFICULTIES OF INDUSTRY.

It is obviously impossible in this volume to undertake the vast task of reviewing and summarising all the legislative and administrative measures by which the efficiency and competitive power of British industry are in one way or another affected. All that is necessary is to refer to those forms of State action which have specially characterised the post-war period. Even limited in this way the field is impossibly wide, as it includes a host of temporary war and post-war measures introduced to meet particular emergencies and now repealed or discontinued. The following summary, therefore, is confined to measures of a class which are still in operation.

Some of the matters falling within the description of State measures have already been dealt with under such headings as standardisation and scientific research. The measures which remain to be summarised relate mainly to transitory action of a financial character to promote employment and trade, or to steps taken to safeguard industry against certain forms of foreign competition or to enable the consumer to distinguish between British and foreign goods.

Financial Assistance to Industry and Trade.

Trade Facilities and Export Credits.

Under this heading mention should first be made of two measures sanctioned by Parliament for the encouragement of trade and employment since the war, viz., the Trade Facilities and Export Credits Schemes. Originally designed to tide over the critical years of financial and economic instability and unemployment which followed the war, they have been more than once renewed for short periods in view of the continuance of exceptional unemployment.

An account of the working of the *Trade Facilities Acts* will be found on page 389. The object of the Acts, the first of which was passed in the autumn of 1921, has been to overcome the prevailing reluctance to incur capital expenditure, in the expectation of a fall in money rates and cost of production. For this purpose guarantees of capital or interest were given by the Treasury under certain conditions, and the guarantees operated to reduce the rate of interest on the money raised, the object being to absorb some of the unemployed in the work of capital construction thus expedited. It will be seen from the figures given in the Memorandum that, of the total guarantees of £65 millions which have been given during the past five years, £27 millions have gone to public utility undertakings (including £12 millions for the extension of the London Underground Railways), £18 millions for manufacture (mining, metals and chemicals, etc.) and £19 millions for shipbuilding. It is stated in the Memorandum that the actual number employed on the new work which was in progress at the time of reporting (and which presumably would not have been in progress but for the guarantees) was 46,000; but it is impossible to state the exact effect on employment which has been produced by the operation of the Acts, since the indirect and deferred effects, both positive and negative, elude calculation. For example, the figure quoted takes no account of the number permanently employed in the new undertakings; while, on the other hand, shipowners have complained of the encouragement given to shipbuilding as tending to depress shipping in view of the excess of shipping tonnage over requirements. So far there has been no appreciable loss to Government through the guarantees, but, of course, the risks have not yet run off. We understand that the Government have come to the conclusion that this form of encouragement to industry and employment has exhausted its usefulness, and they do not propose to ask Parliament to renew the Act when it expires in 1927.

It is evident that the Trade Facilities Scheme belongs to a class of transitory expedients, which, however valuable at the outset, gradually lose their virtue if unduly prolonged, inasmuch as the immediate and visible advantage to employment of anticipating the date at which capital expenditure would otherwise be incurred tends to diminish with the lapse of time until the "anticipation" becomes to a large extent fictitious, while the negative effects become more and more important. Ultimately a point is reached when the advantage secured by ante-dating employment may be more than balanced by the shrinkage of employment in the following years.

The *Export Credits Scheme*, described on page 391, while also designed to encourage trade and employment during the period of instability following the war, follows a somewhat different method from that of the Trade Facilities Act. In effect it is intended to safeguard exporters of British goods to certain markets against the risks arising from instability of financial and economic conditions. Originally the scheme involved direct advances to exporters and

was confined to exports to certain States of Central and South Eastern Europe. Since 1921, however, the procedure has been to guarantee traders' bills, under certain conditions and in return for a premium, in respect of exports of British-made goods, and the geographical area covered by the scheme has been gradually extended until it covers all overseas markets except Russia, though in the case of certain Eastern markets guarantees are not given for short dated bills. The existing procedure has quite recently been superseded by the establishment, on the advice of a special Committee, of an Export Credits Insurance Scheme. It is, however, too early to give any account of the results of this new development, which only took effect in July, 1926.

The figures given on page 393 show that the total guarantees sanctioned since 1921 amounted to about £30 millions, but that not much more than one-fifth of these guarantees were actually used by exporters. This discrepancy is explained in the Memorandum as arising from the fact that would-be tenderers for contracts often arm themselves with the Department's guarantee as a precaution, but eventually obtain the finance elsewhere or fail to obtain the contract. In fact, several tenderers for the same contract often apply and obtain guarantees. On the whole it may fairly be claimed that the value of the scheme to British traders in enabling them to tender with confidence for foreign orders is better measured by the amount of the guarantees sanctioned than by that of the guarantees actually used. The figures on page 394 show that of the total guarantees used nearly two-thirds applied to the metal and engineering trades.

Like the Trade Facilities Act, the Export Credits Scheme can only be regarded as an exceptional expedient, but unlike that Act the scheme has no automatic tendency to exhaust its efficacy with the mere lapse of time. On the other hand, the need for exceptional State action of this kind will diminish as and when the economic and political conditions of the world and especially of Europe become stabilised, and as private enterprise becomes capable of supplying the demand for long term credits and credit insurance. It is satisfactory to learn that since 1921 the Export Credits Scheme has involved no loss to the State. On this basis, it seems reasonable to regard the scheme on the whole as self-supporting, and as therefore not involving any positive subsidy to foreign trade.

Other Financial Assistance to Trade.

The financial assistance accorded to trade and industry by the British Government, other than the guarantees given under the Trade Facilities and Export Credits Schemes, or grants for scientific and industrial research which are shown on page 333–4, is in ordinary circumstances so trifling as to be practically negligible.*

* See pp. 384 etc.

Apart from the temporary coal subsidy referred to below, the housing and unemployment grants, and a few small payments made solely on military or naval grounds, practically the only subsidies in 1924–25 were a grant of about £492,000 for the encouragement of sugar beet cultivation (which is outside the scope of the Committee's inquiry) and a sum of about £139,000 for civil aviation, which is only of interest to manufacturing industry in so far as (like housing grants) it may be partly spent in contracts for manufacture. The only remaining item was a grant of £10,000 to secure a regular service of steamers to the Hebrides, with the object of improving the conditions of life of the population in poor and remote districts.* None of these grants can be said to be bounties in aid of manufacturing industry, nor could the grant, which in 1926–7 amounted to £500,000, to the Empire Marketing Board for furthering the marketing of Empire products in this country, be so described. The temporary subvention to the coal industry was intended to tide over a period of transition while awaiting the results of the investigations of the Coal Commission. Altogether a sum of no less than £23,000,000 has been expended in pursuance of this subvention, which terminated at the end of April, 1926. As is well known, the object of averting a dispute was not achieved, and the Report of the Commission emphatically recommended that the subsidy should not be renewed.

Import duties and prohibitions.

Customs Duties.

The Memoranda on pages 398–415 describe the existing Customs policy of Great Britain and give an account of recent changes therein particularly as regards the growth of Imperial Preference and the imposition of import duties on certain classes of goods, either in the interests of national safety with a view to safeguarding essential supplies in times of emergency (so-called "key industry" duties), or for the purpose of counteracting the effects of depreciating foreign currencies or of other differential conditions which are thought to give an unfair advantage to some classes of foreign imports (so-called "safeguarding" duties). "Anti-dumping" duties of the kind contemplated by the Safeguarding of Industries Act, 1921, would also fall under the latter head, but in fact no such duties have as yet been imposed. Other classes of import duties (e.g. the so-called "McKenna" duties and the new duties on silk) are also described in the Memoranda. They may broadly be described as luxury duties. The new silk duties are accompanied by an excise duty, but it is nevertheless probable that they have some protective effect.

It need hardly be said that the policy of these new classes of import duties and, in fact, the general question of import duties as a method of protecting home industry, are questions which are the subject of acute controversy between political parties. It is no part of the

* In 1925–6 a grant of £25,000 was made in aid of the British Industries Fair advertising campaign.

scheme of the present volume to enter into the merits of these controversies, but only to record the facts and tendencies. This is fully done in the Memoranda, and it is unnecessary to summarise the information in this introduction. In order, however, to enable a clear idea to be formed of the relative magnitude of the different changes which have taken place, and to assign to them their due weight and proportions in the general scheme of Customs policy and practice, it may be useful to give a few figures (see table, page 453).

In the year 1913 the value of total imports retained in the United Kingdom was £659 millions, of which £60·3 millions or 9·1 per cent. were dutiable, and 90·9 per cent. were free of duty. Practically all the dutiable goods were articles of food and drink and tobacco, and in all cases in which the articles imported were of a class also produced in the United Kingdom the import duty was more or less exactly balanced by an excise duty. Hence it may fairly be said that the import duties in force in 1913 (here called the "old duties") were revenue duties with little or no protective intention or effect. In 1923 (the last complete year before the temporary repeal of certain duties in 1924) the value of dutiable imports retained was £130·7 millions, or 13·4 per cent. of the total imports. But it must not be inferred that the increase of dutiable imports from 9·1 to 13·4 per cent. was mainly attributable to new duties. It was in fact mostly due to increases in imports of articles subject to the "old duties." In 1923 the "old" duties accounted for over £120 millions, and the "new" duties for only £3½ millions, of Customs revenue. The value of the retained imports subject to "new" duties amounted in 1923 to £10·6 millions, or just over 1 per cent. of the total value of retained imports of all kinds. In the following year (1924) the value of goods subject to the "new" duties dropped to £7 millions with the repeal of the McKenna duties and the lapsing of certain of the duties under the Safeguarding of Industries Act; and the total "new" duties collected in that year amounted to only £1·4 million. In 1925 the McKenna duties were restored, and new duties were imposed on silk and on lace and certain descriptions of embroidery. These duties, however, were only in force during the second half of the year. The total value of dutiable imports retained in 1925 was £135 millions, or 11·6 per cent. of total retained imports. The "new" duties accounted for £2·4 millions out of a total Customs revenue of just under £102 millions. The marked decline in total Customs revenue as compared with 1923 was due to decreases in the "old" duties. The yield of the "new" duties would, of course, be higher in a year throughout which they had been in force.

The introduction of the principle of Imperial Preference into the Customs Tariff of the United Kingdom has taken place since the war, and therefore, no comparison with pre-war conditions is possible. The latest statistics show that in 1925, out of a total of £149 millions of dutiable goods imported from all sources, the total value of dutiable

goods imported from other parts of the Empire at preferential rates of duty was £60 millions. This total does not include goods which, if of foreign origin, would be subject to "key industry" duties, but since the total value of foreign goods subject to these duties was only £1,534,000 in 1925, and it is certain that the imports from Empire sources of the same classes of goods were much smaller, their inclusion or exclusion makes little practical difference to the totals. It will be seen, therefore, that the value of the imports to which Imperial Preference applies, though only about 5 per cent. of the total value of imports into Great Britain, is more than five times as great as the value of imports covered by the "new duties" of all classes. The advantages derived by British trade from the preferential treatment accorded to it in Empire markets were dealt with in the "Survey of Overseas Markets," and need not be restated here. It is, however, important that, in weighing the advantages and disadvantgaes of according preference in the United Kingdom market to dutiable products of Empire origin, full regard should be paid to the consideration that reciprocal action of this kind may be a necessary condition for ensuring the permanence of the valuable tariff advantages accorded to British exports in overseas Empire markets.

Import Prohibitions.

The Memorandum on page 415 gives an account of the only substantial import prohibition now enforced in Great Britain for the purpose of safeguarding a British industry, viz., the prohibition of the importation of dyestuffs except under licence. This measure belongs essentially to the same class as the "key industry" duties already described, but in view of the prime importance of the industry both in relation to the textile trades and to the production of munitions of war, and of the fact that nothing but temporary prohibition could be relied on as certain to effect its object, the importation of dyestuffs has temporarily been dealt with on a quite exceptional basis by means of an import prohibition imposed by Act of Parliament for a period of ten years from January, 1921. The Act also instituted a licensing system supervised by a committee containing representatives of users and manufacturers as well as persons not directly concerned. The Memorandum on page 419 indicates that this licensing committee has dealt with about 6,000 applications a year, and on the whole the administration of the Act has proceeded with smoothness. While a certain number of complaints have been made to us by witnesses as to the details of the practical working of the system, no trade witnesses have questioned the necessity of adopting exceptional methods to ensure that the dyestuffs industry should be maintained in this country. In an industry so directly exposed to fierce competition as some branches of the textile trades, it is probably inevitable that inconvenience and difficulties will arise from time to time when the importation of an essential material like dyestuffs is subjected to a licensing

system, however carefully devised and worked. It is also certain that these difficulties will be felt more acutely by some sections of the industry than by others, and it is further probable that the licensing system will be held responsible for much more than its real effects. Evidently this is one of those questions in which national and sectional interests may not be in harmony, and a final judgment on merits can only be arrived at by duly balancing all relevant considerations. This would involve travelling outside the limits of the scope of the present volume.

The Marking of Goods.

The whole question of the false marking of goods in respect of such matters as origin, quantity, commercial ownership, etc., is dealt with by the Merchandise Marks Acts, and is to some extent the subject of international regulation under the Industrial Property Convention. The latest revision of this Convention at the Hague Conference of 1925 (see Memorandum, page 424) made greatly improved provision for the suppression of unfair competition due to the creation of confusion between the products of one manufacturer or trader with those of another, or through false representations to the detriment of a rival trader. It also provided better international protection for trade marks and public emblems. As, however, British law has in practically all these matters been ahead of that of most other countries, the effect of the Hague revision, when ratified, will rather be to bring the standard of foreign practice more nearly up to that followed here than to necessitate material alterations of the law in this country.

The Merchandise Marks Act, 1926, provides for a wide extension of the requirements of the earlier Acts (of which the Act of 1887 is the principal) with regard to the marking of imported goods offered for sale. Particulars of these provisions are given in a Memorandum on page 423.

Without going into the merits of a question which is to some extent controversial, we desire to make one observation from the point of view of the smooth working of foreign trade. The multiplication of national laws in different countries imposing varying and sometimes conflicting requirements with regard to marking may eventually give rise to the necessity of co-ordinating such requirements by common agreement so as to avoid the danger that, say, a British manufacturer making the same goods for several foreign markets may be obliged to mark them in several different ways. The new Act referred to above avoids this particular danger so far as relates to its own requirements, but should it lead to the enactment of corresponding, but not identical, measures in other countries, the difficulty may arise in a form requiring to be promptly dealt with.

PROFITS, SAVINGS, BURDENS AND COSTS.

The whole of the questions falling under these headings which are dealt with, to a greater or less extent, in the present volume, are of an extremely intricate and difficult character both from the very defective nature of the data available and the great difficulty of interpreting even such scanty statistical results as can be obtained. Nevertheless, the importance of these matters in relation to any estimate of industrial conditions and efficiency is so great that we have felt it impossible to pass them over in silence, in spite of the fact that any treatment of which they are susceptible, on the basis of the existing data, must be very far from complete or satisfactory. It should be added that the general question of costs of production is reserved for such treatment as may be found possible in the next volume in connexion with the survey of industries. Accordingly, the only elements of industrial costs which are dealt with in the present volume are those arising from (1) public charges, and (2) railway transport, both of which elements, though for different reasons, can be more conveniently treated as a whole than in connexion with particular groups of trades.

The Profits of Trade and Industry.

The term " profit " is one which is used in many different senses. In the following pages it means the disposable surplus after meeting the cost of production, i.e., it includes sums distributed in dividend or placed to reserve after meeting the expenses of production, including maintenance and depreciation and other overhead charges. Even this description, however, is not altogether free from ambiguity, since different views may be held as to the proper sum to be debited to costs in respect of such items as depreciation. For this reason statistics of profits based on the published accounts of companies may not agree precisely with those derived from the Board of Inland Revenue. In a general survey, however, of industry, any minor differences of this kind are of much less importance than the fundamental difficulty of finding a common basis of comparison for industrial profits. Should they be expressed in terms of capital or of turnover ? The most familiar method is to express profit as a percentage of capital, partly from the analogy of interest (i.e., the annual charge for the use of capital), and partly because profits are commonly regarded as the reward of the capitalist as such. For the purpose, however, of comparisons, either with pre-war conditions or between different groups of industries, the determination of the real meaning and measurement of capital presents such difficulties as to render impracticable this mode of expressing profits. A very usual method of arriving at the true capital value of a going concern is to apply an appropriate multiple (differing for each class of business) of its anticipated profits, so that if we attempted to adopt the true

market valuation of industrial capital as the basis on which to calculate profits, we should merely be moving in a circle. If, to avoid this pitfall, we take as our basis the actual amount of capital originally invested in the concern, it is clear that the whole foundation of the comparison with pre-war conditions is vitiated by the change in money values during the interval.

In the Memorandum on page 458, are given certain tables, based on quarterly statements published in the "Economist," showing the amount of capital (including debentures, as well as paid up capital, but not reserves or bank loans) and of profit (including debenture interest, dividends, and allocation to reserves etc.) of a group of 472 public industrial companies* in the year 1913–14 and of over 700 in the three years 1923–24 to 1925–26 respectively, the division of the total capital into its various descriptions (ordinary, preference, etc.) and the allocation of profit to interest or dividend or to reserve. The statistics are subject to a number of qualifications as to comparability and representative character which are stated in the Memorandum, and they are based only on a relatively limited number of companies. Hence, while they may be regarded as affording an indication of the trend of affairs comparing the end of the period with the beginning, the exactitude of the figures for any one of the years separately cannot be definitely asserted. Subject to these qualifications, the statistics indicate that the average "profit" (as explained immediately above) of the companies included in the return,* measured in terms of capital, was $9\frac{1}{2}$ per cent. on the mean of the last three years compared with $10\frac{1}{2}$ per cent. in the year immediately preceding the war. In both cases the figure includes sums put to reserve. But a comparison of the two figures does not measure the change which has taken place in the real remuneration of the owners of the capital, since, in so far as the capital on which the post-war profit is calculated was invested before the war, the value on which the rate of profit is calculated has been upset by price changes in the interval. If it were possible to make the necessary correction, the result would certainly be to show a considerable decline in the "real" rate of profit as compared with 1913–14.

The interpretation of statistics of industrial profits per unit of capital is so difficult and hazardous, and subject to so many qualifications and reservations, that it seems impossible to find any firm ground on which to base definite conclusions. Before, however, turning to the alternative method of estimating profits per unit of turnover, one or two observations may be made on the statistics of capitalisation and profits contained in the Memorandum which do not give rise to the same difficulties.

* Excluding railways and public utility undertakings, but including manufacture, trading and shipping.

Broadly speaking, it would appear that in 1925–26 nearly half the capital invested in the companies included in the return was "ordinary capital," nearly 20 per cent. debentures, and the remaining 33 per cent. "preference." Before the war, assuming the figures to be fairly comparable, the proportion of debenture capital was rather higher (28 per cent.) and of ordinary capital rather lower (43 per cent.). The average dividend paid on the ordinary capital fell from $11\frac{1}{3}$ per cent. in 1913–14 to $10\frac{1}{2}$ per cent. in 1925–26. The amount placed to reserve in 1925–26 was £20 millions (or 1·7 per cent. of the total capital) compared with £14 millions (or 2·9 per cent. of the total capital) in 1913–14. The figures showing the amounts placed to reserve represent the balance between additions to and withdrawals from reserve during the two years compared. In some industries (e.g., iron and steel and coal) withdrawals in 1925–26 considerably exceeded additions. No doubt in some cases dividends were partly paid out of sums withdrawn from reserve, while in other cases additions to reserve diminished the rates of dividend.

When we turn from capital to turnover as the basis of calculating profit, we encounter a fresh set of difficulties in place of those which we avoid, but fortunately for purposes of general comparisons, the new difficulties are, on the whole, less formidable than the old. Clearly the rate of profit on turnover affords no means of comparing the profitableness, say, of a "vertical" combination, which carries through every process of production from raw materials to finished product, with that of a business which is limited to a single process or to the marketing of the product. Nor does it enable us to make any satisfactory comparison between the rates of profit earned in different groups of trades which are differently situated as regards materials and other essential conditions. But these differences are eliminated if the sole comparison is between the same trades or groups of trades over a given period, though there doubtless remain such difficulties as arise from the imperfect character of the data or the disturbing effect of rapidly oscillating prices.

In the Memorandum on page 460 are given certain statistics of pre-war and post-war profits of industry and trade, calculated in terms of turnover. The statistics, which relate to *profits as computed for income-tax purposes*,* are taken from a memorandum submitted to Lord Colwyn's Committee on National Debt and Taxation by Mr. W. H. Coates on the basis of statistics compiled in the Inland Revenue Department. The post-war year to which the figures relate is 1922–23 (i.e., they include profits made in any year of traders' account which ended during the financial year 1922–23). It is understood that they were specially extracted at considerable cost for the purpose of the inquiry, and that, consequently, no corresponding figures for later years are available. It should be

* Subject to certain modifications so as to secure a true comparison between profit and turnover (*see* p. 466).

mentioned that the figures, which are based on samples described in the Memorandum as "fairly large," are limited to corporate enterprises, inasmuch as the so-called "profits" of private firms usually contain an element of personal remuneration which make them not fairly comparable.

The net result of the investigation is to show that the average rate of profit, as defined in the preceding paragraph, for all the industries and trades included in the inquiry was round about 5 per cent. of the turnover, and that the percentage fell slightly between 1912-13 and 1922–23. Thus, on the basis of the arithmetical mean, the rate declined from 5·8 per cent. to 5·43 per cent. On the basis of the "median"* the fall was from 4·61 to 4·11 per cent. Roughly speaking, therefore, it may be said that the average rate of profit on turnover declined in the decade by something in the neighbourhood of one-tenth. When the whole mass of cases are classified by groups of trades, the results are very interesting.

Average rate of profit on turnover.

	1912–13.	1922–23.	1922–23 *as a percentage of* 1912–13.
Cotton	7·00	2·47	35
Wool	8·19	9·78	120
Iron and steel, etc.	7·49	7·74	103
Miscellaneous metal industries	6·10	5·22	86
Food	5·07	7·11	140
Wholesale distribution	3·90	4·14	106
Retail distribution ..	8·48	5·14	60

The effect of the deep depression in the cotton trade is strikingly brought out, and a considerable decline is shown in the average profit on turnover in the retail trades.† On the other hand, the food and wool trades show material increases. It should be repeated that the *figures are only of value in comparing the profits of the same trade at two periods*, and must not be used for cross comparison between different trades, still less for estimating the proportion of the net total industrial output of the country which represents profit. We return to this last point later. It should also be remembered that the post-war figures relate solely to a single year, 1922–23, which may not have been typical of more recent conditions.

* i.e., the middle term in a series of observations arranged in order of magnitude. While the "median" is not a true weighted average, it has certain advantages in eliminating the effect of a few extreme and abnormal cases.

† But see page 465 and footnote on page 52 as to the comparability of the figures for this group.

While the average profit on turnover shown by the seven groups of industries as a whole declined but slightly as between 1912–13 and 1922–23, the uncertainty of the results of business appears to have been much greater in the latter year, as is shown by the much wider "dispersion" of the recorded rates of profit and loss. The statistical measure of this increased uncertainty rose by no less than 67 per cent.* To put the matter another way, we find that in 1912–13 the proportion of aggregate turnover which was attended by an actual loss was only 2 per cent., while the proportion on which a profit of 20 per cent. or more was realised was also 2 per cent. In 1922–23 these proportions were 14 and 6 respectively. If particular groups of industries be considered, the results are still more striking. In cotton the percentage of aggregate output produced at a loss in 1912–13 was only 1 per cent.; in 1922–23 it was 30 per cent. of the whole. In the wool trades (the average profit of which showed a material increase), the proportion carried on at a loss rose from 1 to 9 per cent.; while in the iron and steel and kindred trades (in which the average profit also rose slightly) the proportion carried on at a loss rose from 2 per cent. to 17 per cent. In the miscellaneous metal industries the corresponding proportion rose from 1 to 22 per cent. The other groups also show an increase in the proportion of business carried on at a loss. The same tendency to increased dispersion appears if the other extremity of the scale be examined. For example, the proportion of the woollen output which showed a profit of 20 per cent. or more was negligible in 1912–13, but rose to 11 per cent. in 1922–23. In the iron and steel and kindred trades the corresponding proportion rose from $3\frac{1}{2}$ to 14. Even in the depressed cotton trade the proportion on which a profit of 20 per cent. or more was realised rose from $\frac{1}{2}$ per cent. to nearly 4 per cent. of the whole. Each of the seven groups (except retail distribution†) shows an increase in the degree of uncertainty of financial results as measured by the "mean deviation from the median," the increase being no less than 160 per cent. for cotton, 150 per cent. for wool, and 100 per cent. for iron and steel. Thus all the evidence shows that, while on the whole the relation of "average profit" to turnover has been fairly stable with a slight tendency to fall, the individual results of business have shown greatly increased uncertainty in recent years, the final "average profit" being the result of balancing increased gains at one end of the scale against increased losses at the other end.

As stated above, the comparison of profit with turnover gives no direct indication of the proportion of the net product of industry

* This is the percentage increase in what is technically termed the "mean deviation from the median."

† This exception may be partly connected with the spread of the great departmental stores, but it is probably partly due to want of comparability in the data. In any case it is to be remembered that the figures only relate to *corporate bodies* and thus do not include the great mass of the ordinary retail traders.

which is absorbed by profit at one or other of the stages of production. For the aggregate of business turnover is a gross figure very largely exceeding the net product, since many items (e.g. materials and semi-finished products) appear over and over again in the totals. The Census of Production of 1907 showed that at that date the gross value of industrial products at the place of production (i.e. the "aggregate turnover" up to but not including distribution or transport) was about $2\frac{1}{2}$ times the value of the net product, in the sense of the added value after excluding duplication and materials imported, or purchased from non-industrial sources. If this proportion still holds (as to which there can be no certain information until the present Census of Production is completed), it would appear that a profit of 5 per cent. on industrial turnover would correspond to about $12\frac{1}{2}$ per cent. of the value *at works* of the net product of industry, as defined above. An independent estimate of purely industrial profits (including sums put to reserve),* based on the Census of Production of 1907, pointed to a total of about £117 millions in that year, or over 16 per cent. of the value at works of the net product.

Another important source of information on the subject is a statistical table of "trading profits," prepared for Lord Colwyn's Committee by the Board of Inland Revenue, and placed at our disposal by the courtesy of that Committee (see page 469-70). This table refers only to companies, but includes the whole of distributive and transport profits, and also profits earned abroad. While for these reasons it is not comparable with the above estimates of purely industrial profits, it is of value in comparing pre-war and post-war conditions. It shows that, in the years 1912 and 1923, the aggregate of companies' trading profits in this sense of the term amounted to £312 millions and £474 millions respectively. The former figure would be equivalent, at the price level of 1923, to about £500 millions,† so that the total of trading profits of companies (making allowance for the change in price level) shows a slight decline. But it should be repeated that the year 1923 may not be fully typical of the most recent conditions. It is to be understood that by "trading profit" is meant the surplus over costs *before* allocating sums to reserves, or deducting income tax. The deduction of income tax would have reduced the profit of companies in the two years compared to £294 millions in 1912 (equivalent to about £470 millions at the price level of 1923) and £367 millions in 1923, a decline of nearly one-quarter.

* For details, see note on p. 468.

† Here and elsewhere throughout this Section, conversion between post-war and pre-war values is effected by means of the Board of Trade index number of wholesale prices. As compared with 1913 (= 100), the average figure for 1912 was 98·6, and the averages for post-war years were:—

1923	158·9
1924	166·2
1925	159·1

If, as is probable, a somewhat higher proportion of the country's trade was carried on by companies in 1923 than in 1912, the decline in aggregate trading profits would be proportionately greater than is indicated by the above figures.

The amounts put to reserve in the two years by the companies included in the above return increased from £96·1 millions in 1912 (£153 millions at the 1923 price-level) to £168·4 millions in the later year. The small rise is practically negligible, especially in view of the fact that the return for 1923 covers a greater part of the total area of industrial enterprise than that for 1912. If, however, the total amount placed to reserve, measured by 1923 values, remained nearly stationary, it formed a considerably higher proportion of net profits, amounting in 1923 to nearly one-half the net profits remaining after deduction of income tax, compared with one-third in 1912. This increase in the proportion of trading profit put to reserve accords with what might have been expected *a priori*, in view of the greatly enhanced uncertainty of trade conditions, which, as already shown, is reflected in the figures given above of the " dispersion " of trade profits. The increase may be regarded to some extent as a prudent effort to insure against the vicissitudes of the period of unsettlement following the war.

The broad conclusion is that at 1923 prices the trading profits actually distributed (i.e., after deducting sums allocated to reserves and income tax) to the owners of joint stock business enterprises amounted very roughly to £320 millions in 1912 and £200 millions in 1923, a decline of nearly two-fifths. The total sum thus distributed is subject to individual adjustments by way both of rebates on small incomes and of supertax on large incomes, before the net sum actually available for individual spending or saving can be precisely arrived at. But it is unlikely that these adjustments (which tell in opposite directions) would have a material effect on the broad conclusion that, measured in 1923 values, the sum available for individual saving out of the distributed trading profits of companies declined by at least £100 millions between 1912 and 1923. Of course, sums allocated to reserve constitute a form of collective saving, but as the sums so allocated in the two years compared were about the same, after allowing for the change in price level, it makes no difference to the comparison whether reserves be included or excluded.

The above analysis does not of itself enable us to say how far high taxation checks saving. It does, however, indicate fairly clearly that the decrease in net distributed trading profits is one of the main sources of the serious decline in national savings to which we now turn our attention.

National Savings.

There are no statistical materials for calculating accurately the total annual savings of the population, but from an examination of such partial indications as are available, certain general estimates,

more or less conjectural, have been arrived at which, while involving a considerable margin of possible error, give a sufficient indication of the general trend for the purposes of the present Introduction. On the basis of material compiled for the Census of Production it is estimated that national savings just before the war amounted to from £380 to £400 millions sterling per annum. At the price level of 1925 this would be equivalent to between £600 and £650 millions. The savings of 1925 have been variously estimated at £400, £450 and £500 millions. Although these figures are subject to an even wider margin of error than the pre-war estimates, they leave no possible doubt that there is a large deficiency of annual savings compared with the period before the war. This deficiency is probably in the neighbourhood of £150 millions.

In what classes of the population has the saving habit declined? Not, apparently, among the wage earners, although the available statistics are for various reasons not very conclusive. Some figures are given in the Table on page 470. From these it will be seen that the Post Office and Trustee Savings Banks deposits have been steadily increasing since the war, and both absolutely and relatively to price levels they exceed the 1913 figure. There are also £459 millions National Savings Certificates, a security non-existent in 1913, of which at least a considerable part is doubtless held by "small savers." The assets of Building Societies have also notably increased. In considering the saving habits of the people as a whole, account must also be taken of the compulsory saving by wage-earners for sickness and unemployment under the Insurance Acts, which have been greatly extended since before the war. Much is heard of the spread of habits of extravagance and self-indulgence, but the statistical evidence is rather negative than positive. The entire expenditure of the population on amusements subject to the entertainments tax is not much over £50 millions a year, while the consumption of alcoholic liquors declined by 40 per cent. between 1913 and 1924, a decline represented at 1913 prices by £56 millions, or more than the whole expenditure on entertainments. It is true that, owing mainly to increased taxation, the average price of alcoholic liquors has trebled in the interval, so that actual expenditure thereon has largely increased in spite of the heavy drop in consumption. But in such circumstances the volume of consumption probably affords a truer index than money value of changes in national habits of self-indulgence or restraint. We are driven to suppose that the main source of the deficiency of national savings is diminished saving by classes other than wage-earners, and this is *a priori* probable since the margin of income for saving in middle-class households has almost certainly contracted. Thus the contraction of saving has mainly occurred in the income tax paying class. How far is this contraction directly due to heavy taxation? It is not possible to answer this question statistically, or to apportion the responsibility for

the deficiency between local causes, such as the pressure of rates and taxes, and general causes such as the increased poverty of the world (including both this country and its customers) arising out of the war. Nevertheless, certain figures as to the increase since 1913 in direct taxation and local rates will be of assistance in considering the question. (See pages 471 and 473).

In 1913–14 the aggregate yield of the principal direct taxes was £84·6 millions, equivalent to about £135 millions at 1925 prices. In 1925–26 the aggregate was about £427 millions, showing an increased burden of £292 millions, of which £250 millions is accounted for by income tax and super-tax. During the same period, local rates in Great Britain rose from £79 millions in 1913–14 (equivalent at 1925 prices to £127 millions) to £166 millions in 1925–26, an increased burden of £39 millions. Hence the annual burden of direct taxation and rates may be said to have increased by about £331 millions, of which 75 per cent. is accounted for by income and super-tax, 13 per cent. by other forms of direct taxation, and 12 per cent. by local rates. At the same time the rates of income tax have been more steeply graduated. On moderate incomes the rate is now, roughly, treble what it was before the war, but large incomes pay a greatly increased proportion.

But here a qualification of great importance is necessary. It is impossible to measure the effect of a tax on the national margin available for saving, merely by considering the amount abstracted by the tax-collector from the tax-payer as such. Much will depend on the ultimate destination of the funds raised by taxation, for a considerable part of such sums are in fact used for purposes as likely to conduce to saving as the objects to which they would have been devoted if, to use a classic phrase, they had been "left to fructify in the pockets of the tax-payer." For example, that part of the income-tax applied for the purpose of the service of the internal debt can hardly have a very serious effect on aggregate saving, since the amount so applied is redistributed in dividend to members of approximately the same class, while sums expended on debt redemption actually enhance the national savings. When it is remembered that the expenditure in 1925–26 on the internal debt service was in excess of £300 millions, it will be realised what very large qualifications are necessary before making any confident assertion as to the proportion of the deficiency of national savings which can be ascribed to the pressure of income tax. Nevertheless, it is impossible to hold that high taxation is without effect on total national savings, not only because it reduces the margin of income available for individual saving, but also because of its psychological reaction in encouraging a spendthrift habit of mind, especially among the richer classes. On the other hand, it is probable that the world depression of trade has had a greater effect than taxation in diminishing national savings.

It is to be understood that we are here concerned solely with the broad effect on national saving of high rates and taxes as such, and not with particular defects and grievances relating to details of assessment, allowances or administrative methods, important as such questions of detail undoubtedly are for trade and industry.

The Burden on Industry of Public Charges.

In the previous section, which dealt with national savings, the question of the effect of high taxation in checking savings has been briefly discussed. But this is not the only way in which high taxation may add to the difficulty of carrying on industry, nor is Imperial taxation the only kind of public charge by which industry may be burdened and its competitive power impaired. Many trade witnesses have referred to the difficulties caused by the increase since pre-war years in the burden of these imposts, and many comparisons have been attempted or suggested between the present and the pre-war position, or between the existing position of British manufacturers and their foreign competitors in this respect. It must be said at once that, while striking examples based on individual experience may be given of the comparative burden on British and foreign undertakings of taxation and other public charges, no satisfactory data are obtainable for instituting a really sound comparison of British and foreign conditions in this respect, in view both of the paucity of material available and the very different systems under which such taxes and charges are levied and apportioned. How essential it is, when estimating the burden on industry of any given tax or charge, to know precisely the basis on which it is levied is clearly evident if we compare the effects on industrial costs of a given charge according as it is levied in the form of income tax, local rate, or compulsory contributions to insurance. In the first case (subject to the qualifications indicated below), the tax is not a charge on costs but on profits, i.e. a deduction from any surplus which may remain after the cost of production has been met. In the second case, the local rates, being assessed on the annual value of industrial premises, will fall directly upon costs,* and their burden will be in inverse proportion to the volume of output ; for in times of depressed trade the total rates have to be spread over a smaller production, and the percentage which they form of the cost of producing a unit of output will consequently be higher than in

* The economic theory that " differential " rates (i.e. the difference between actual rates and those levied on premises of " marginal " utility) ultimately form a deduction from rent and hence do not in the long run raise costs may be disregarded for practical purposes when considering immediate and short period effects.

times of prosperity.* Lastly, the contribution by employers to compulsory social insurance or workmen's compensation is definitely proportioned to the number employed, and hence roughly to the industrial output.† This burden is (unlike income tax) a direct charge on costs, but, generally speaking, it is not (like local rates) a charge which increases in proportion to the falling off in output.

Imperial Taxation.

As regards the incidence of direct taxation on costs, we feel that in view of the examination of the subject by Lord Colwyn's Committee it is unnecessary in this introduction to treat the question in any great detail. There is no doubt that the indirect influence of high taxation on industry and trade (e.g. in diminishing saving and discouraging initiative) is much more important than its direct effects. At the same time, the direct effects on costs, though small in relation to the aggregate burden, may in some cases be by no means negligible, in spite of the fact that income tax is intended to be levied only on the surplus after costs have been met. For example, in enterprises in which the salaries of higher staff or fees to outside experts amount to an appreciable percentage of total costs, it has been represented to us that the level of the remuneration necessary to obtain the services required has been materially raised by the fact that the recipients are subject to heavy income tax. An extreme illustration was afforded by the case of a publisher who stated that he has to make proportionally higher payments to authors because of the income tax they have to pay. Moreover, it is to be remembered that the surplus on which income tax is levied may not necessarily coincide with the actual profit realised by a particular business during the period in which the tax is operative. While on the average and in the long run profits assessed to income tax probably correspond fairly closely to the profits actually realised by trade, it is evident that in the case of individual businesses they will not always be identical with the profits realised in a particular year; and wherever there is a divergence to the detriment of the tax-payer, there is liable to be, *pro tanto*, a real burden on his costs. For example, different views are held, whether justifiably or not, as to the methods on which allowances for depreciation should be calculated. It is clear, however, that the principal effects of high income tax on industry are not of a kind which lend themselves to statistical evaluation.

* An interesting example of the effect which may be produced on the incidence of rates by a decrease of output and employment is afforded by the Table on page 492, which shows for 1914–15 and 1924–25 the amount of rates levied in respect of 63 engineering and shipbuilding firms in the Glasgow neighbourhood both absolutely and in proportion to the number employed. The figures show that the *amount* of rates so levied rose in the interval by 177 per cent. As, however, the number employed fell in the same period by one-third, the average incidence of rates *per person employed* more than quadrupled.

† This is not quite true in cases where under-employment prevails.

It must be understood that references in this section to the incidence of Income Tax do not apply to the so-called "Schedule A Income Tax" which is not primarily a tax on income but on occupied premises. The incidence of Schedule A taxation on industrial costs is more or less analogous to that of local rates, to which we now pass.

Local Rates.

Local rates form an undoubted item in the cost of production. As already stated, the total rates levied in Great Britain in 1913–14 amounted to £79 millions, which at the values of 1925 would be equivalent to £127 millions. In 1925–26 the total amount levied was £166 millions. The amounts per head of population (at the values of 1925) were roughly £3 0*s.* 6*d.* and £3 15*s.* 10*d.* in the two years respectively. It would therefore appear that, even allowing for the change in the value of money, the burden of rates per head of the population has risen by about one-fourth.

These figures, however, throw no direct light on the burden of rates on industry, since they make no distinction between rates levied on private householders and on business premises respectively. The only definite information on this point which the Committee have been able to obtain relates to Scotland, and is limited to a single year (1923–24). It shows that of the total rates levied, one-eighth fell on the premises of industrial undertakings, one-eighth on public utility undertakings, two-thirds on houses and shops, and the remaining fraction on agricultural land and miscellaneous subjects (see page 475). If similar proportions hold for England and Wales,* the total amount of rates on manufacturing premises in Great Britain in 1925–26 would appear to be about £21 millions.

Information obtained directly by the Committee from the owners of a number of industrial undertakings shows the percentage of their total cost of production (or in some cases the cost of production of specific articles) which was attributable to local rates in the years 1913 and 1924. (See Table on p. 482.) The figures relate only to twenty-three undertakings in the engineering, iron and steel, textile and other industries, and the percentages borne by rates to total cost naturally varied very widely within the group. Taking, however, the "median" of all the undertakings we find that rates represented 0·35 per cent. of the cost of production in 1913 and 0·55 per cent. in 1924.† The basis of the statistics is, of course, too narrow to warrant us in regarding them as fully representative, but such as they are, they show that, over the undertakings included in the table, the proportion borne by rates to costs has risen by about three-fifths. No doubt a certain part of the percentage increase may be ascribed to diminished volume of production, the rates being now

* An examination of such relevant data as exist does not suggest that the proportions would be very different.

† A few of the accounts referred to 1925.

spread over a smaller output. As in the meantime industrial costs have themselves increased considerably, it follows that the money cost of local rates in proportion to volume of output (i.e., disregarding the change in money values) has increased much more rapidly than is shown above, having probably at least trebled since 1913.

The above figures are very far from representing the total burden of rates on production, i.e., the proportion of the value of the net product which is due to local rates, since they take no account of the cumulative effect of the rates levied at each stage of production. In order to ascertain this proportion, regard must be paid to the qualification already noted on page 53 when treating of the question of the relation of profit to net product. As in the case of profit, so in the case of rates it is necessary to multiply the percentage borne to cost of production by the factor $2\frac{1}{2}$, which represents approximately the relation between the gross aggregate of turnover and the value of net product (after allowing for duplication, etc.). The figures already given, though very restricted in range, suggest that local rates are in the proportion of about one-half per cent. to turnover, and, if this is fairly representative, it indicates that the average proportion of the value of the net product of industry attributable to local rates is in the neighbourhood of $1\frac{1}{4}$ per cent. This conclusion is confirmed by the rough estimate already made of the total amount of rates levied on the premises of industrial undertakings, viz. £21 millions, which lies between 1 and $1\frac{1}{2}$ per cent. of the total net value of industrial production. It need hardly be added that these percentages refer only to industry as a whole, and are not applicable to any particular trade.

Statistics as to the incidence of local rates are available for the greater part of the coal-mining industry and for the railways of Great Britain. In coal-mining, rates rose from 1·64 to 2·14 per cent. of the cost of production between 1913 and 1925. Measured per unit of output the rise was not far short of 200 per cent. In the case of railways, the burden of rates, while much higher in proportion to total costs than the figures given above, has not kept pace with the general rise of costs, the percentage of rates to total working expenditure being 6·3 in 1913 and 4·6 in 1925. Railway costs have in the meantime more than doubled, and the amount of local rates per unit of "output" as measured roughly by engine mileage increased between 1913 and 1924 by about two-thirds.

Insurance and Workmen's Compensation.

Another form of public charge on industry which has materially increased since the war is the compulsory contribution by employers towards health and unemployment insurance, and their payments for workmen's compensation (see pages 476–9). A great part of the increase under these headings is due to the wide extension of

the scope of unemployment insurance in 1920, and the raised contributions which have been necessitated by increases both in rates and in duration of unemployment benefit. The prolonged and widespread unemployment which has persisted until the present time has also necessitated increased contributions from all parties to maintain the solvency of the unemployment fund, and to repay Treasury advances. The combined effect has been to raise the total contribution of employers from about £900,000 in 1913–14 to about £19½ millions in 1924–25. Calculated on the basis of the total number of insured workpeople employed in the two years, the average annual contribution of employers to unemployment insurance has risen from about 8*s.* to nearly 37*s.* per head of insured persons employed. If calculated on the total number of persons employed in 1913 in trades now subject to insurance, the average for 1913 would be about 1*s.* 6*d.* per head. In 1913, employers' contributions to national health insurance are estimated to have amounted to about £7¾ millions and in 1924 to about £14¼ millions, equivalent, roughly, to 12*s.* per head of insured persons employed in 1913 as compared with 20*s.* per head in 1924. As regards the cost to employers of workmen's compensation, it has been estimated that, in seven large groups of industry employing 7½ million persons, the charge for compensation, including administrative costs, amounted to about £5 millions in 1913 and to £9 millions in 1924 ; or an annual average per person employed of about 13*s.* in 1913 and about 24*s.* in 1924.

Thus in 1924 the aggregate burden on the average employer of compulsory social insurance and workmen's compensation was probably in the neighbourhood of £4 a year per insurable person employed,* or perhaps about 3 per cent. of his total wages bill.

This very rough estimate may be supplemented, as in the case of local rates, by particulars supplied by a certain number of undertakings as to the percentage of their costs attributable to social insurance and workmen's compensation in 1913 and 1924 (or 1925) respectively.† These particulars have been furnished by nineteen undertakings, mostly the same as those for which particulars have already been given of the incidence of rates. Naturally, the figures show wide variations, some of the industries represented having been subject to unemployment insurance contributions in both years, whereas others were first brought within the range after 1914. If, however, we take the "median" (in order to exclude the effect of extreme cases) we find that the "amount" of these "social" charges more than doubled in the interval, while the proportion they bore to total costs of production rose by about two-thirds, viz. from 0·33 per cent. in 1913 to 0·57 per cent. in 1924. Looking at the matter in another way, it would appear that the incidence of the

* From January, 1926, this total needs to be increased by about 15*s.* per head on account of the new liability for widows', orphans' and old age contributory pensions.

† See Table on p. 483.

social services under consideration amounted in the case of these particular undertakings to an average of rather more than 3 per cent. of the wages bill—a result in close conformity with that arrived at above by independent estimate. Notwithstanding the corroboration afforded by this agreement, it would be a mistake to regard the figures representing the percentage borne by " social services " expenditure to total cost as more than illustrations of a tendency, in view of their comparatively narrow basis, and of the wide differences between the results shown by different works and industries. In estimating the ratio of insurance costs to the value of the net product, the same correction for cumulative effect has to be made as in the case of rates. Hence we may say very roughly that this charge is on the average in the neighbourhood of $1\frac{1}{4}$ per cent. of the value of the net product.

Analysis of railway costs throughout Great Britain shows that health and unemployment insurance payments and workmen's compensation accounted for the same percentage (0·91) of total working expenditure in 1913 and in 1924. In the case of coal-mining, these charges rose from 1·92 per cent. of cost of production in 1913 to 2·24 per cent. in 1925. For gas companies, health and unemployment insurance payments (without workmen's compensation) represented 0·3 per cent. of cost in 1913 and 0·7 per cent. in 1924.

It cannot be pretended that the statistical data here presented are comprehensive or satisfactory, but in the absence of more complete information they suffice to suggest that the burden on manufacturing industry of local rates and " social service " charges taken together, while varying very widely according to the nature of the undertaking, is, on the average, in the neighbourhood of 2 to 3 per cent. of the net value of the output, or, say, 6 to 8 per cent. of the total wages bill, and that both these percentages are probably about twice as great as in 1913. If the general change of money values were disregarded, and the percentages calculated in terms of volume rather than of value of output, it would appear that the money cost of local rates and social services per unit of output has at least trebled since 1913.

The Cost to Industry of Railway Transport.

One of the factors in manufacturing and trading costs which, in the case of heavy and bulky goods, may be of very great importance is the cost of carriage by rail of the goods to their inland market or port of shipment, and of the materials used in their manufacture to the factory where they are produced. Accordingly an endeavour has been made to obtain particulars which would enable a general idea to be formed of the comparative incidence of railway charges at the beginning of 1925 (the date to which the particulars relate) and just before the war, and also of their absolute incidence in the case of a certain number of selected articles. The procedure followed is

described in the Memorandum on page 493, and the particulars obtained are set out in the tables annexed thereto. It is not difficult to infer by inspection of the tables that, broadly speaking, the railway rates tabulated were rather more than 50 per cent. (say 52½ per cent.) above pre-war rates. The general level of railway rates as a whole was somewhat higher, being about 54 per cent. above the 1914 level.*

In order, however, to express the real incidence of railway rates in relation to the total cost or selling price of an article, a good deal of calculation is necessary. It is obvious that, for this purpose, a general average based on all kinds of goods, which include articles with such widely divergent values per ton as fine textiles and coal, would be meaningless, nor would an estimate which disregarded the average length of haul be of great practical value. The nature and methods of calculation employed, the results obtained therefrom and the qualifications to which these results are subject are set out on pages 493–6 of the Memorandum, which enables a rough comparison to be made both of the incidence of railway charges on the carriage of different classes of goods, and the proportion borne by such charges to the average value of the goods carried.

The figures naturally show very wide variations in cost of carriage as between different classes of goods, whether measured in relation to quantity or to value. Moreover, as is to be expected, these two modes of calculating comparative cost of transport often lead to opposite results. For example, while the cost per ton of transporting coal over the " average haul " is much lower than that of any other class of goods (2*s.* 2*d.* for export and 4*s.* 8*d.*, for land sale in 1925, as compared with 17*s.* 3*d.* or more for machinery) the proportion which the cost of railway carriage bears to the value of the coal is much higher than the average for other important products (9·2 per cent. for exported coal compared with 1 per cent. or less for machinery).

Generally speaking, the figures indicate that the importance of railway rates to manufacturers and traders is very much greater in the case of heavy and cheap articles than in that of the finer and more expensive products. They do not, however, by themselves afford even an approximate measure of the *total* cost of railway transport which is incurred in respect of the production and marketing of each article, inasmuch as they only represent the cost of carrying the article when made, and do not include the cost (often much greater) of carrying the materials of which the article is made to the place of manufacture. How great the relative importance of this factor may be is clearly brought out by certain examples relating to boots and shoes, cotton piece goods, and pig iron and steel, for which the calculations are given in the Memorandum.

The example relating to boots and shoes showed that while the total charge for carrying a ton of boots by rail from factory to

* Notice has been given of an increase in railway rates, to come into force on 1st February, 1927, the effect of which will be to raise the general level to about 64 per cent. above the 1914 level.

destination was £1 18*s.* 7*d.*, the railway charges on the materials required for making that ton of boots (hides, leather and tanning materials) amounted to no less than £6 5*s.* 0*d.*, or more than three times as much.

In the case of cotton piece goods, the statistics indicate that on a piece of cotton cloth, the price of which in 1926 was 266·63 pence, the aggregate cost of transport at all stages from the carriage of the raw cotton to the carriage of the finished piece goods to the port of shipment amounted to about 4·93 pence, or 1·85 per cent. of the value of the cloth. Of the above cost of transport, however, less than one-tenth represented the cost of carriage of the finished cloth to the port of shipment.

As regards pig iron, it is shown that in 1925 the average railway charges per ton of Cleveland pig iron were 23*s.* 5*d.*, or, roughly, 30 per cent. of the market price of the pig iron.* But of this total only about one-quarter (6*s.* 3*d.*) represented the average cost of carrying the pig iron to the steel works, the remaining 17*s.* 2*d.* representing the cost of carriage of the necessary materials (coal, limestone and ironstone) to the furnaces. Again, the total cost in 1925 of rail carriage per ton of steel plates from their place of manufacture on the North East Coast to their destination (a shipyard on the Wear) was 30*s.* 2*d.*, or, say, 17 per cent. of the market price,* but of this, less than one-fifth (i.e. 5*s.* 10*d.*) was attributable to the carriage of the plates, the remaining 24*s.* 4*d.* being accounted for by the carriage of pig iron, limestone, ore, coal and coke to the steel works.

Naturally these proportions vary according to the locality of the works. For example, the table on page 520 shows that in the case of an iron and steel works in South Yorkshire the total railway charges per ton of pig-iron produced averaged about 16*s.* 4*d.* in 1924, of which 10*s.* 2*d.* (or five-eighths) was the cost of conveying materials to the works, and 6*s.* 2*d.* (or three-eighths) the cost of conveying the product to destination. In the case of steel plates, sheets and bars the figures with regard to the same firm show an average of 28*s.* per ton as the aggregate cost of railway transport, of which 19*s.* 3*d.* (or two-thirds) was the cost of carrying material to works and 8*s.* 9*d.* (or one-third) the cost of conveying the product to destination.

The above examples sufficiently illustrate the fact that, generally speaking, the railway transport charges on materials used in manufacture amount to a much heavier percentage of the cost of the finished goods than the railway rates for carrying these manufactured goods to their destination in Great Britain or to the port of exportation. They also bring out clearly the great importance of the cost of coal carriage in the case of industries like iron and steel, which

* Naturally in all these calculations the percentage of cost of transport to market price varies continually with the movement of prices.

are largely dependent on coal. It appears further that, generally speaking, the cost of railway transport at the beginning of 1925 bore a slightly lower relation to the value of the goods carried than immediately before the war.

It may be added that the above figures and comparisons relate solely to the charges for carrying the same goods between the same places on different dates and take no account of any possible differences in the character or efficiency of the services and facilities supplied. The efficiency of transport services generally to meet industrial needs will be discussed in connexion with the surveys of the great groups of industries which will occupy the next volume.

CONCLUSION.

As the present volume only represents one part of the survey relating to factors in industrial efficiency it would evidently be premature, even were it practicable, to attempt at the present stage to marshal its results in a final summary, still more to attempt to indicate the lessons and conclusions to be drawn therefrom. This volume is only to be regarded as a contribution to the study of certain important elements of a vast group of inter-related economic problems, all of which have to be thoroughly explored before final recommendations can be formulated.

But it is impossible to glance through the material collected in this and previous volumes without being impressed by the frequency with which the same reflection is suggested by very different sets of facts, gathered from different quarters and bearing on different aspects of the questions referred to us.

The vitality of modern industry, like that of an organism, is measured by its power of response to external stimulus and of self-adaptation to modified environment. "Mobility" (in this sense of the term) does not imply incessant or purposeless movement or change, and may be consistent with a high degree of stability and complexity of structure. But it does imply the power of spontaneous reaction to changes in economic conditions, and of internal modification and rearrangement to meet such changes. This is true both of the material and the human factors, of methods of business organisation and of relations among classes, as well as of the personal skill, enterprise and leadership which individuals bring into the common stock. It applies, for example, to the ever-changing types of industrial structure, and the varying forms and degrees of intimacy of the relations between business undertakings which are suited to the varying conditions and stages of economic development. It applies to modes of preparation for industry, and the right adjustment between the functions of school education and workshop training, which demand continual modification and re-adaptation,

both to fit the changing needs of modern large-scale industry and to counteract some of the dangers of excessive sub-division of employments. It is equally true of the relations of industry to such matters as standardisation, scientific research and industrial art, all of which demand qualities of imagination and breadth of view, freedom from prejudice and an open mind, receptive to the lessons of experience both at home and abroad. The principle of mobility is equally important in all that concerns the lines of differentiation between the functions performed by different factors in production and distribution, or by different classes or groups of workers. Finally, it is true of the right determination of the limits between the domains of public and private enterprise, which, so far from being rigidly fixed for all time and all circumstances, are essentially mobile, in accordance with particular conditions and phases of economic development. In times of national emergency or transition the limits of public action for the encouragement of trade may be widely different from those appropriate to permanent and normal conditions, and forms of co-operation between public and private effort that may be well suited to foster a useful development in its initial stages may become unnecessary or even harmful when maturity has been reached.

It is, therefore, a matter of supreme necessity in this period of rapid and insistent flux and transformation to maintain unimpaired the qualities of initiative and flexibility of temperament, the power of readjustment and adaptation, and the capacity for free and willing co-operation among all the partners in production and distribution. Any waning of these powers could only mean an increasing rigidity and ossification of economic structure, and a progressive enfeeblement of its vitality, for which no measures of external support or defensive organisation could compensate. There is no need for pessimism in this matter if the situation is faced with courage and an open mind. In addition to the economic problems which British trade had to face before the war, the vast disturbance and impoverishment caused by that catastrophe dealt a staggering, and for the time a numbing blow at industry and commerce ; and manufacturers and traders are now carrying, and for many years must carry, a very heavy, though it is to be hoped diminishing load, not only of public charges but of other burdens incidental to and calculated to retard the progress of recuperation. Nevertheless, it cannot be doubted that in British industry there lies latent a great power of energetic co-operation and response to changing conditions. But it needs the exercise of the highest qualities of imaginative leadership and of loyal goodwill to evoke and mobilise this reserve power and direct it to the common benefit.

December, 1926.

CHAPTER 4.

INDUSTRIAL STRUCTURE.

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COMBINATION IN INDUSTRY AND TRADE.

(*Furnished by the Board of Trade.*)

The progress of the industrial revolution in Great Britain during the earlier half of the nineteenth century was marked by increasing freedom and force of competition in industry as old restrictive regulations were swept away and as transport enormously improved. About the middle of the century a reversal of this tendency began to be noticed in such instances as municipal gas and water enterprises and the merging of railway companies; and during the last quarter of the century there was a marked trend towards the limitation of competition in many ways. This tendency can be traced in the development of each of the highly industrialised countries. It is the purpose of the present memorandum to give some account of this trend, the types of organisation evolved, and the degree to which they have achieved their objects in this country, in Germany, in France, and in the United States of America. In doing so attention will be confined to agreements and combinations among manufacturers and among commercial organisations. It is not the purpose of this memorandum to deal with State monopolies or to describe the development and effect of combinations of workpeople.

Causes of Tendency to limit Competition.

A description of the various types of organisation and the extent to which those types have developed in the various countries will be clearer if note is first taken of some of the chief causes of their formation and continuance.

(i) *Increased size of establishments.*—As industrial technique and organisation have developed, there has, on the whole, been a continuous increase in the size of individual works. This, while not necessarily inconsistent with the maintenance of free competition, has resulted, in some industries, in the number of manufacturing plants being diminished, in spite of an increase in the aggregate output of the industry. In so far as the number of competitors is reduced, it becomes easier to arrange an agreement for restricting competition. Further, the growth in size of highly specialised manufacturing plants made possible a degree of competition which was previously not experienced. Being unable to adapt their plant to other uses, manufacturers had an incentive to continue production in times of depression not only so long as they could earn anything towards their heavy fixed charges but even at an actual loss, provided that such loss was not too great. By so doing

they prevented their business from being unduly disorganised, and might hope to be able to take advantage of any improvement in industrial conditions. Competition of this kind may drag down a whole industry into insolvency, and the businesses affected are naturally prompted to consider what remedies are possible. They may be led to adopt some form of combination with a view to regulating prices or curtailing output. Thus, out of extreme competition tends to emerge combination.

(ii) *Increased cost of equipment.*—The growing size of industrial undertakings and the large amount of machinery frequently required involve the investment of an increased amount of capital to equip a plant of a high degree of efficiency. This may serve to reduce or delay the entrance of new competitors and thus to make combinations of existing undertakings in the industry more effective.

(iii) *Better Transport.*—Improvements in the means of transport tended to localise industries in particular districts since the necessity for manufacturing close to the consumer diminished, and the locality most favourable for manufacture of any particular commodity could be chosen. It is obviously easier for manufacturers to arrange restriction of competition when they are near together and personally known to one another, and when, possibly, they co-operate for other purposes (e.g., negotiations with labour, political affairs, and other interests of the trade as a whole), than it would be otherwise. In such circumstances questions relating to selling prices or output may be discussed quite casually and an agreement of an informal nature may be reached, leading later to a more definite arrangement.

(iv) *Marketing.*—With the widening of markets consequent upon the improvements in transport, more elaborate marketing organisation was required than when markets were predominantly local. As an increasing proportion of the cost thus involved was in many industries purely competitive, the incentive to combine for the purpose of marketing more cheaply tended to increase. The objects of such combinations were to reduce the number of commercial travellers, to cut down advertising expenses, to reduce the amount of capital required to be invested in stocks, and by delivering in all cases from the nearest works to economise in freight charges. In some cases more effective organisation of the export trade may have operated as a motive.

(v) *Improved Technique.*—Generally speaking, the cheapening of production is rather one of the methods by which a combination strengthens its position after formation than an actual object of its formation. The possibility, however, of reducing costs by concentrating the knowledge and experience of a number of individual firms in the hands of one organisation, and thus effecting improvements both of industrial technique and of organisation, has been an incentive to combination in some cases.

(vi) *Patents.*—It is obvious that limitation of competition is facilitated where a particular firm or group of firms has a special advantage conferred by the possession of patent rights. This factor has, of course, only operated in industries in which patents are possible, but in the industries concerned it has doubtless been of great importance. A somewhat similar effect has been produced through a knowledge of secret processes and the possession of trade-marks.

(vii) *Raw Materials.*—Organisations with power of market control have been built up on the possession of exclusive rights over the supply of raw materials, or advantages in the use of other productive resources, e.g., water. In such cases the establishment of a single control over a manufacturing industry may appear to be a quite natural step, and its accomplishment relatively easy.

(viii) *Monopolistic buying.*—Another motive in the formation of combinations has been the endeavour to reach a position from which it might be possible to obtain exceptionally advantageous terms by " squeezing " producers of raw materials or other goods or services (e.g., railway transport) of which the organisation is the principal or a very large buyer.

(ix) *Import Duties.*—Another consideration is that, while the absence of import duties does not necessarily imply the existence of competition, a protective tariff offers additional inducements to combination with a view to limiting competition. For a tariff tends to leave home manufacturers in possession of the market, with the result that they may be encouraged to combine in order to raise the price of their goods almost to the level of the taxed commodities imported.

In considering these nine causes, it is evident that the first six are of quite general application, and may be assumed to have similar effect in one country as in another. The three latter, however—exclusive rights over supplies of raw material, the possibility of monopolistic buying, and the fiscal system—must obviously vary in their effect from country to country with the differing conditions.

Before turning to the experience of the United Kingdom and other countries, one further point of general importance may be noted. That is, that when an important industry obtains anything approximating to monopolistic power, industries which are brought into close business relations with it tend also to place their interests under a single control for the purpose of more effective bargaining. This applies also to competing industries in different countries, the existence of a powerful trust or combination in one country leading to the formation of similar organisations in other countries with a view to more effective competition, or to international agreement for delimitation of markets, etc. The effect of the formation of a powerful combination is consequently cumulative.

Varieties of Organisations for Limiting Competition.

Organisations which limit competition range from mere informal understandings between competing producers or merchants, to the giant business which controls the whole output and conditions of sale of a particular commodity. Between these two extremes lie a great variety of organisations exercising economic power in very varying degrees. Some of the principal varieties may be noted :—

(i) *Informal understandings or "gentlemen's agreements"* between competing producers or merchants as to prices to be charged or areas to be served. Such agreements must always have been common in local trade.

(ii) *Associations for regulating prices.* These involve a more formal agreement between competing producers or merchants who form an association to fix minimum prices at which they will sell.

(iii) *Associations for regulating output.* The simpler form of organisation is for an association of competing producers to arrange during a period of depression that only a proportion of the plant of each firm shall be worked, in order that production may be curtailed and prices increased or maintained. In other cases the actual output of each producer may be fixed, and he is expected (whether subject to fine or not) not to exceed it.

(iv) *Pooling associations.* A common type of pooling association is that in which each member pays a small fixed sum per unit of output into a pool, which, at regular intervals, is divided up equally among the contributors after the formation of a reserve fund. Under a more elaborate form of arrangement each producer is allotted a percentage of the aggregate output of all the producers in the association, the percentage being fixed on the basis of ascertained experience in the recent past. If a producer exceeds his percentage of the total output, he pays into the pool a sum proportionate to the excess, calculated on an agreed basis ; if a producer falls short of his percentage he receives from the pool a sum, calculated also on an agreed basis (though not necessarily the same basis as is applicable to excess production), proportionate to the deficiency. In some cases pooling associations also fix prices.

(v) *Associations for allocating contracts.* Such associations exist in certain industries where work is allotted by tender. The association decides which firm is to receive a particular contract and it is arranged that other firms either do not tender or tender high. In some cases it is arranged that the members of the associations shall each be allotted a particular area.

(vi) *The selling agency.* A number of firms making the same article agree to turn over their output to a common selling agency, so as to avoid undercutting. There may be no regulation of output.

(vii) *The participating cartel with selling syndicate.* This form of organisation was adopted in Germany in a number of industries. The essence is that competing producers agree to establish for a definite period a joint selling agency for the exclusive sale of their products, and that each producer is allotted a "participation" in the total output. Those who exceed their participation pay a fine, those who fall short of it receive an indemnity. The selling agency or syndicate is registered as a company in which the individual producers are shareholders with votes in proportion to their output. The members fix a base price for their products covering cost of production, and sell to the syndicate at an accounting price which is usually somewhat higher. The syndicate sells to the consumer at the highest price that it can get, adjusting its price to circumstances in different parts of the market, though it does not as a rule sell below the accounting price. A feature of some of the German Cartels—notably the Stahlwerksverband—before the war was the subsidising of the export trade, especially in years of depression.

(viii) *Variations of the participating cartel with selling syndicate.* In some cases there are variations of structure in the direction of the trust. The syndicate may acquire a considerable degree of independence or it may fall under the control of a particular concern or group.

(ix) *Financial community of interests* (*Interessengemeinschaft*). This is established when two or more companies agree for a period of years (sometimes as many as fifty) to pool the whole of their profits and divide them up between the companies in pre-arranged proportions. The organisation remains in theory temporary, and the companies retain a separate existence, each with its own management; but they may work closely together by means of joint committees. Experience shows that there is a tendency for this form of organisation to give way to a more complete union.

(x) *The "voting" trust.* This form of organisation became prevalent at one period in the United States, until it was held by the Courts to be illegal.* A number of competing companies agreed to assign the whole of their stock to a group of trustees, receiving in exchange trust certificates representing the valuation of their properties. The trustees were thus able to exercise complete control over all the businesses. This is in theory a permanent form of organisation.

(xi) *Exchange of shares.* Two or more companies may link their fortunes together by means of an exchange of shares. The precise effect depends upon the relative sizes of the companies and the number and proportion of shares exchanged. Where one company predominates in size and purchases the whole or a majority of the shares, the other company becomes virtually a subsidiary though it may possess a voice in the management of the larger concern.

* See page 104.

(xii) *Holding companies.* Another method of establishing unity is for each of a group of companies to sell its shares, or a majority of them, to another company, established for the purpose or already existing, the shareholders of the individual companies receiving in exchange shares in the holding company. The individual companies continue to exist, and to enjoy a greater or less degree of autonomy, but their general policy is controlled by the holding company in the interests of the whole group of undertakings.

(xiii) *Consolidations or mergers.* These denote the consolidation or merging of two or more businesses into a single undertaking. The businesses taken over completely lose their separate existence.

In this list the various types of organisation have been placed in an ascending order leading up from the " gentlemen's agreement " between independent firms to the complete fusion of businesses in a single undertaking, and, in considering these types of organisation, it is evident that a distinction may be drawn between the first eight or nine—the position of the Interessengemeinschaft, being in some respects intermediate—and the last four. The former are of the nature of temporary agreements for certain particular purposes between producers or merchants who remain independent in other respects ; the latter represent permanent unions of undertakings in which the component parts may or may not retain a limited degree of autonomy. The former may be designated broadly " terminable associations " while the latter (in those cases where they exercise any considerable degree of market control) are called " trusts." It is in this sense that these terms should be read throughout the present memorandum, unless they are otherwise explained in the context.

Great Britain.

Circumstances of development of Combinations.

By the beginning of the nineteenth century the old laws, chiefly of mediaeval origin, against monopolistic action had fallen into disuse, and the only restriction remaining was that inherent in the doctrine of the English common law that agreements in restraint of trade are void and unenforceable at law. In the application of this doctrine the courts tended to recognise the principle of free contract and, generally speaking, to find a contract good if it appeared in all the circumstances of the case reasonable and if it appeared to be made upon a good or adequate consideration so as to make it a proper and useful contract, even though some of the provisions might technically be in restraint of trade. Thus, the state of the law after the beginning of the nineteenth century was not a factor of direct importance in controlling any tendency to combination in industry and trade, although a power of control was embodied in the common law and doubtless would have been exercised had the movement become so widespread as to arouse general apprehension.

In a later paragraph the position of a number of important industries is described individually, but it is convenient here to trace very briefly the general effect in Great Britain of some of the causes which have been mentioned above as tending to encourage the formation of combinations. The causes noted as being of quite general application have, of course, been operative in this country as elsewhere, and instances of their influence will be found throughout the individual descriptions below. As to the factors varying in importance from country to country, the outstanding fact is that their influence has been comparatively weak in Great Britain. First, as to the question of raw material; the great development of British industry occurred round the coal supplies, and no form of unified control over coal has yet been established, owing primarily to the scattered nature of the British coalfields. Very few combinations, if any, in this country have built their economic power upon the basis of exclusive possession of raw materials. Probably the Salt Manufacturers' Association with its principal member, the Salt Union Limited, approaches most nearly to that position. With regard to the exercise of monopolistic power in buying, apart from purely local rings of dealers which may aim at keeping down the price to be paid (e.g. in the case of agricultural produce), it does not appear to be the case that organisations have been formed in order to extort specially favourable terms either from primary producers of from distributive organisations such as railway companies; so far as bargaining with the railway companies is concerned, the distance between the interior and the ports in Great Britain is too short to give this motive the same force as it had, for example, in the United States, and the companies are too powerful. Nor is the position different with regard to shipping companies. How little influence the motive of driving a hard bargain with the latter has had with manufacturers and merchants may be judged from the fact that the Royal Commission on Shipping Rings in 1909 advocated the encouragement of associations of merchants and shippers to bargain with the shipping interests which had established a system of deferred rebates (see p. 88). There are a number of associations having special arrangements with merchants or retailers by which the latter receive deferred rebates on condition of exclusive purchase from members of the association, as, for example, those of the National Light Castings Association with the builders' merchants. The obtaining of rebates, however, never seems to have been a dominating influence in the formation of combines in this country, as was, at one time, the case in the United States.

Protective tariffs may be influential in promoting the formation of combinations or in increasing their power when they are once formed, but it is obvious that in Great Britain the tendency towards combination owes little or nothing to their agency. In fact, the possibility or actuality of foreign competition and the ease with which essential raw materials can be obtained from abroad have

operated as a powerful check upon the exercise of monopoly influence in this country. The fact, for example, that great quantities of iron ore can be and are imported into this country at a low cost has diminished the advantage which might have been obtained from the establishment of control over the British iron deposits ; and in this respect the position differs from that in the United States where some of the principal deposits are owned by a single vast concern.

While none of these causes have been strongly operative in Great Britain in leading to the formation of either trusts or terminable associations, there is another factor which is worthy of mention. Some of the most powerful combinations in Great Britain owe their position to special advantages arising from skill in manufacture and rely for their prosperity upon the consequent reputation of their products, rather than upon their ability to raise prices above the competitive level. Such organisations may be said to represent the combination at its best. In other cases, however, and especially where foreign competition is impossible or highly unlikely, economic power has been based upon the fact that the magnitude of the resources of a combination enable it, when necessary, to sell temporarily below cost so as to destroy independent businesses and strangle incipient competition. In the result a powerful organisation may be able to maintain prices considerably above the competitive level.

Types Evolved.

Before proceeding to describe the conditions in the various industries, it may be as well to notice briefly the prevalent types of terminable associations and trusts in Great Britain. Where economically powerful combinations existed in British industry before the war, " terminable associations " of different kinds were on the whole the favourite form ; " trusts," while important or dominant in particular branches of industry, being nevertheless the exception. Generally speaking, this is still the position. Both types, however, have become more numerous, as under war conditions an impetus was given to their formation. The creation of terminable associations was due in many cases to the necessity during the war for more frequent consultation between industry and the Government, which found it convenient to deal with an organisation rather than with a number of individuals. Where an association has been formed, for whatever primary purpose—e.g. to conduct negotiations with Government Departments or Trade Unions, to promote research, etc.—the suggestion and adoption of a policy of regulating prices or output may naturally follow. A Report on Retail Milk Prices, made in October, 1926, by the Food Council gives a striking instance of this process. The two separate associations of milk distributors in London, which had disagreed between themselves in April about the retail price, were brought together on the London Milk Pool Committee established by the Government during the general strike

in May; and the trade members of that Committee used it in August as a means of agreeing upon an increase in prices. The formation of trusts, too, seems to have been promoted in certain industries (e.g. explosives) during or immediately after the war by the fear of excessive competition consequent upon the extension of plant for the requirements of the war, and by the necessity for industries to act as a whole in finding new outlets for productive plant.

Terminable Associations.—The "Gentlemen's Agreement" as to prices has no doubt been common at all times, especially in local trade, but, in the nature of the case, information with regard to the prevalence of such agreements at any time is not available. As will be seen from the details in the following section, the methods most commonly adopted by associations in Great Britain which aim at limiting competition are the fixing of minimum prices and the pooling system in one or other of its forms. The latter may be combined with a system of fixed prices, and, perhaps, with a system of deferred rebates payable to those who buy exclusively from members of the association. Examples of associations having other arrangements are, however, found. Associations for regulating output only are relatively uncommon, an example being the arrangements for organised short time made by the Federation of Master Cotton Spinners' Associations, under which, however, no attempt was made to fix directly the aggregate output of the industry or the proportion to be produced by each firm. Associations for allocating orders exist in certain industries where contracts are awarded upon tenders, the Association arranging which firm is to have the order and instructing other firms to tender high. Instances mentioned below relate to telephone cables and to cast iron pipes. Joint selling agencies are comparatively uncommon, though examples are to be found in the machine tool industry, the steel sheet trade, among the locomotive manufacturers, and in the agency set up in China by certain British manufacturers of engineering products. The fully developed cartel, which is a joint selling agency combined with a pooling arrangement, is also uncommon in Great Britain, though such an organisation was in existence for a period after the war among the producers of china clay.

Trusts. Though trusts of the various descriptions enumerated on pages 72-73 are to be found in British industry (with the exception of the "voting trust," which is now mainly of historical interest in connection with American developments), yet it will become clear on examination of the instances mentioned later that few of the British trusts are purely of the types described; few consist merely of companies bound together by exchange of shares; few are merely holding companies; and few are entirely unified undertakings. Many are holding companies to some extent and consolidations to some extent; while they may also have allied themselves with other companies by means of exchange of shares or interlocking directorates.

There are a number of instances of trusts and terminable associations existing side by side in the same industry, the trust dominating the association, though not itself controlling the whole output : as instances of this, soap manufacture and salt manufacture may be mentioned. As an instance of a terminable association bordering upon a trust with complete monopoly of British production, the case of alkali may be cited, the two producing companies with the companies which they control having maintained a close agreement between themselves. (See also the reference to the chemical industry on page 83.)

Circumstances of Individual Industries.

In this section some account will be given of the trusts or terminable associations having to any appreciable degree a unified control of prices or output in various important industries, or in sections of them. The object will be to show the comparative position as to limitation of competition in the various industries, and details will not be given of mere consolidations or concentrations of ownership. Particulars of these will be given in the volume to be subsequently published dealing with individual industries.

The Board of Trade have no power to require information to be furnished by trade associations or business amalgamations showing the nature or extent of the control which they may exercise over production, distribution, or price ; and the particulars available are therefore necessarily incomplete, and in some cases may not include details of the most recent developments.

The information which follows regarding the position in this country is based primarily upon the reports published in 1920 and 1921 of the Committees which were set up in accordance with the Profiteering Act, 1919, to enquire into the existence of trade combinations in various industries, and upon other information collected in connection with the Profiteering Act. A list of the industries upon which reports were published is given on page 91. Use has also been made of information embodied in the Report, dated 1919, of the Committee on Trusts (Cd. 9236) and of the memoranda appended to it. More recent information from other sources has also been incorporated where it has been available. The account of the position in Germany, France and the United States and the account of international trusts and combinations is based upon various published works, and upon information which has appeared in the press.

Coal. There have, as is well known, been some large concentrations of ownership, and there are a number of associations of coal owners and associations of merchants or retailers, which, no doubt, exercise a local influence in maintaining prices. But the scattered nature of the British coalfields and the diversity of the markets which they supply have hitherto prevented the establishment of unified control of either pit-head prices, output, or distribution.

Iron and Steel. There are two outstanding facts in the recent history of the iron and steel industries, namely, the spread of the "vertical" combination (i.e. combination of undertakings at different but successive stages of manufacture of an article); and the existence of a very large number of terminable associations regulating prices.

With regard to the former, it must be remembered that British iron and steel manufacturers have never been in danger of finding themselves in the hands of a monopoly controlling either of their two essential raw materials, iron ore and coal. As to iron ore, not only are the British deposits scattered, but there has always been a considerable use of imported ores; the position as to coal has just been indicated. Even before the war many iron and steel works had acquired their own coal and iron mines, the principal reason perhaps being that they had attained such a size through combination with other producers, or through mere expansion, that they could conveniently take the output of a coal or iron mine and thus eliminate middlemen's profits. There were obvious advantages, moreover, in possessing assured and conveniently situated sources of supply of coal of suitable and known quality. Whatever the reason, the buying up of coal and iron properties by iron and steel manufacturers has been greatly accelerated during the last ten years, and it is estimated that pig iron manufacturers now control their ore supply to the extent of over 70 per cent. of the total, and their coal supply to the extent of over 60 per cent., apart from large quantities of coal which they produce for sale in the open market. It is questionable whether the resulting giant organisations ought to be described as trusts since it is not clear that they can exercise any control over prices. Some of them may be able to do so in connection with particular products, but otherwise they can only exercise a general influence should they combine to do so with the other giant businesses in the industry.

Terminable associations for regulating prices or output exist in almost all branches of the industry subsequent to the production of pig iron and ingot steel. Each of these associations aims at covering the whole of a particular stage or branch of production, either throughout Great Britain or in defined areas. To mention a number of these associations, the market in rolled steel products is controlled by the various steel makers' associations which fix base prices and extras, and allow a rebate to producers who buy only from members of the associations. The Scottish Steelmakers' Association and the English and Scottish Steel Founders' Association, and five associations in the steel castings trade have pooling arrangements under which members pay part of their profits into the pool and divide the amount equally among the members at stated intervals. In the Ferro-Manganese Association and the Spiegel Association, which consist of the same five members, every member participates to the extent of a fifth in the profits of the whole quantity sold. In the

case of the Woven Wire Association, the Cased Tube Association, the Shoe Rivet Manufacturers' Association and others, the percentage of trade for each member is fixed ; and payments into the pool are made by those who exceed their percentage and payments out to those who fall short.

The National Light Castings Association, founded in 1911, represented by the end of 1912 about 95 per cent. of the output of the industry, and steps were at once taken to regulate output and raise prices, the industry having experienced a period of acute depression. The Association is organised on the basis of a pooling arrangement, members who exceed their prescribed quota making payments into the pool, and those who fall short of their quota receiving payments from the pool. There is a system of deferred rebates in operation with the organisations of the builders' merchants conditional upon exclusive dealing and strict conformity to the price list. The Cast Iron Pipe Association has existed since 1908 and includes practically all makers of cast iron pipes cast vertically in dry sand. The Association fixes minimum prices and decides which member's turn it is to tender higher prices. The Cut Nails Association, which controls practically the whole production of cut steel nails, fixes minimum prices and controls output by a pooling system.

In the tinplate industry, the low prices then ruling led to the formation, in October, 1922, of a Stabilisation of Prices Committee covering practically the whole of the Welsh tinplate production. Fixed prices were arranged and an agreement made to buy all steel required for tinplate making from the members of the South Wales Siemens Steel Association, the latter undertaking to sell at a fixed price and to give monthly rebates. The arrangement came to an end in April, 1925, when, for a number of reasons, it was decided not to maintain the fixed selling price of tinplates. After this decision, there was no arrangement as to prices or output, or as to the purchasing of steel ; but an organisation was kept up for recording the amount of sales and output each month. In February, 1926, a scheme for pooling orders was adopted in the industry.

The international arrangement entered into by the Rail Makers' Association is described below (see page 111).

Metal-working Trades, Engineering, and Shipbuilding.—Developments in the large group of metal-working trades may be summarised by saying that, while trusts are non-existent, there are a considerable number of terminable associations covering almost the whole of the non-ferrous metal industries and a great part of the more or less standardised finished metal products, such as tubes, wire ropes, steel pens and edge tools ; but that as the products become more individualised price-fixing associations become less frequent, being rare in the higher branches of the machine making industry and altogether absent in shipbuilding. As in the case of the iron and steel industry, there has been some tendency on the part of large engineering firms to form vertical combinations.

In the non-ferrous metal industries a number of associations work together as the Associated Brass and Copper Manufacturers of Great Britain and control prices throughout almost the whole of the trades with which they are concerned, a policy which is also pursued by the Lead Manufacturers' Association and the Nickel Silver Association.

Coming to the more or less standardised finished metal products, the Saw Manufacturers' and the Edge Tool Manufacturers' Associations represent almost the whole output of those articles and secure uniformity of selling prices, while the Council of Small Tool Manufacturers controls about 75 per cent. of the trade and has arrangements with the High-speed Steel Association under which its own members receive discounts on exclusive buying from members of that association and in turn allow discounts to the Ironmongers Federated Associations in return for exclusive purchasing. The tube-making industry is completely in the hands of associations; the British Tube Association fixes prices, and members of it concentrate on making particular sizes and pass on to other members orders received for sizes not made by the firm getting the order; and the Cased Tube Association and the Close Joint Iron and Steel Tube Association have pooling arrangements and agreements with customers for exclusive purchasing. The Bedstead Makers' Federation, formed in 1912 after a period of intense competition, comprises about two-thirds of the makers; a committee controls selling prices and terms of delivery both in the home and export trade and works a pooling system based on proportions of the whole output of the federation. It also makes arrangements for unifying, so far as possible, the purchasing of raw materials so as to eliminate competition between members of the federation.

In the more highly specialised sections of the engineering industry, the British Cycle and Motor Cycle Manufacturers' Union has agreements for the maintenance of prices, while the Motor Trade Association fixes prices for proprietary goods. The Washing Machine Makers' Association covers about 70 per cent. of this trade and has a complete system of price regulation and a pool. The Agricultural Engineers' Association, representing almost the whole of the trade, is able to arrange agreements between manufacturers, while the Winding Engine Makers' Association, covering about 70 per cent. of the output, does not control prices but has a pooling system and a system of reporting all prices on tender, a plan which is also followed by the Boiler Manufacturers' Association. The section of the industry in which associations are most largely developed, however, is the textile machinery section, in which associations for price fixing have made considerable headway. In the manufacture of accessories for textile machinery the membership of associations is practically complete, but in the manufacture of textile machinery itself there are said to be important firms outside the associations.

It may be of interest to mention here attempts made in the engineering industry to carry on co-operative selling in particular markets. Thus, in 1919, the majority of the members of the *Locomotive Manufacturers' Association* formed a selling organisation to prosecute the Chinese market in common. This organisation has an office in China and each member tenders, the joint organisation putting forward the lowest tender and endeavouring to get it accepted instead of any foreign tender. In 1913 a number of important *engineering* firms formed a company known as Representation for British Manufacturers, Limited, for obtaining orders for their products from China. The capital was used for keeping up offices in China and the company negotiated business on behalf of each particular manufacturer, who financed his own business secured for him by the company. This organisation came to an end in 1923, when conditions in China were very disturbed and the future uncertain.

Electrical Manufacturing.—Prices are dealt with by groups of individual manufacturers in each section of the industry. There are several associations in or connected with electrical cable manufacture. The Cable Makers' Association was formed in 1899, and represents about 80 per cent. of the cable-making industry. Standard prices are agreed upon by the members, and the Association has discount arrangements with the organisations of the main consumers. An association of the Independent Cable-makers has also been formed in connection with the representation of their interest upon the Joint Industrial Council for the industry. The Telephone Cable Makers' Association, formed in 1907 in consequence of a period of intense competition, covers about 95 per cent. of the output. It arranges selling prices and (except in connection with Post Office contracts) allocates to its members orders on the basis of agreed percentages of the total. The High Conductivity Copper Association was formed in 1903 to stabilise prices. In the electric lamp industry the Electric Lamp Manufacturers' Association, which comprises over 90 per cent. of the industry, controls factors and retailers, fixes prices at all stages, and regulates output. Reference to the international agreement existing in the electric lamp industry is made below (see page 112).

Textiles.—Generally speaking, the spinning and weaving branches of the textile industries have hitherto been carried on by a large number of firms under conditions of free competition. Sectional combinations exist, but few of them fix prices or regulate output. On the other hand, associated action with limitation of competition has long been prevalent in the bleaching, dyeing, printing and finishing branches, as well as in the combing of wool.

In the cotton trade, united action has been taken on several occasions by the Federation of Master Cotton Spinners' Associations to organise short time in the spinning section during periods of

depression. In 1923, and again in 1926, during such a period, the Federation attempted to fix basic prices of yarn, but the attempt had to be abandoned. In 1926, spinners representing a majority of the spindles spinning American cotton for sale proposed to establish as a limited company an American Yarn Association with the object of fixing minimum prices for yarn of various grades. The capital of the Association would be contributed by members in proportion to spindleage, only 1*s.* in the £ being called up in the first instance. A member who infringed the provisions of the articles would be liable to pay up the whole of the uncalled part of his shares, and to be expelled from the Association. It should be added that the Association is intended to function as a permanent body.

The manufacture of sewing cotton provides, in the firm of Messrs. J. & P. Coats, Limited, an outstanding example of a trust having control of the market. Messrs. Coats are closely associated with the American Thread Company, and own factories in many countries, so that they can supply by far the greater part of the world's sewing cotton. Marketing is conducted by a central selling agency, which supplies the retailer at a fixed discount off the selling price.

In the fine cotton spinning section of the cotton industry an outstanding concern is the Fine Cotton Spinners' and Doublers' Association, Ltd. Founded originally in 1898, the company—which is organised as a holding company—controls no less than 45 spinning companies in this country.

In the woollen and worsted industries there are a number of trade associations, several of which regulate prices or production: for example, the Wool Combing Employers' Federation, the Wool Carbonisers' Federation, the Blanket Manufacturers' Association, the Uniform Cloth and Serge Manufacturers' Group, and a number of associations in the carpet trade.

In the jute trade competition remains the rule, though there has been one large concentration of capital; and combination plays but little part in the linen industry, except in the manufacture of thread, in which Messrs. Coats are dominant. The artificial silk industry, so far as Great Britain is concerned, has been practically in the hands of two large firms, Messrs. Courtaulds, Limited, and British Celanese, Limited; but a number of fresh businesses have recently been started.

As indicated above, the bleaching, dyeing, printing and finishing branches of the textile trades are very largely in the hands of "trusts," and there are also some price-fixing organisations to which the trusts may belong. The Bleachers' Association, Limited, originally established in 1900 as an amalgamation of numerous independent firms, now dominates the bleaching of cotton piece goods; while the Calico Printers' Association, Ltd., another amalgamation formed in 1899, comprises an important part of the calico

printing industry. The Bradford Dyers' Association, Ltd., constituted in 1898, controls a large percentage of the Bradford piece dyeing trade; the British Cotton and Wool Dyers' Association controls a very large number of firms engaged in dyeing, bleaching, printing and sizing cotton yarn and woollen and worsted yarns; and the English Velvet and Cord Dyers' Association, formed in 1899, covers a large part of the dyeing and finishing processes of velvets, cords, etc. These "associations" are not voluntary associations of separate and independent manufacturers, but are limited liability companies directly engaged in printing, dyeing, and so forth. In most cases there is also an association (in the ordinary sense) of which the trust is a member. For example, the Calico Printers' Association is a member of the Federation of Calico Printers, which is a price-fixing terminable association. The Federation was formed during the war and covers about 90 per cent. of the output of calico prints.

Chemicals. The heavy branches of the chemical industry are to a very large extent controlled by the United Alkali Company, Limited, and Messrs. Brunner Mond & Company, Ltd., between whom there has long existed a close working agreement. In the explosives industry there were a number of separate concerns linked together by terminable associations prior to the formation in 1918 of Explosives Trades, Limited (subsequently re-named Nobel Industries, Limited), which has since dominated the industry. In the autumn of 1926 a provisional agreement was reached for the fusion of the United Alkali Co., Ltd., Brunner Mond & Co., Ltd., and Nobel Industries, Ltd., together with the British Dyestuffs Corporation, Ltd., which occupies an important position in the manufacture of dyestuffs. A new company, to be known as Imperial Chemical Industries, Ltd., is to be formed, which will issue shares in exchange for those of the four companies to be amalgamated. An important reason for the fusion is the desire to be in a position to meet the German chemical trust and the American trusts on a footing of equality.

Another merger of importance is Borax Consolidated, Limited, formed in 1899 to unite twelve companies owning factories in England, France, Austria and the United States and the chief mines and sources of production of borax.

There are a number of terminable associations in various branches of the chemical industries which include price-fixing among their activities. Salt manufacture provides an example of a terminable association largely dominated by one great firm. The Salt Manufacturers' Association was formed in 1915 and comprises most of the manufacturers in the Cheshire district. The aggregate output of the manufacturers who joined the Association represented, in 1913, 90 per cent. of the total output of the United Kingdom. As the Association has an understanding with the North-Eastern Salt Company,

which is a joint selling agency of the manufacturers in the Middlesbrough district, the Salt Manufacturers' Association controls directly or indirectly 95 per cent. of the salt output. Salt Union, Limited, however, alone produces 60 per cent. of the output, and consequently controls the action of the Association. After enquiry under the Profiteering Acts, it was reported in 1920 that the Association had increased very materially the price of salt, and by abolishing price-cutting had made the trade remunerative to both manufacturers and merchants.

A powerful organisation connected with one aspect of the chemical trade is the Proprietary Articles Trade Association, which controls some 5,000 proprietary articles—drugs, patent medicines, fancy toilet goods, etc.—sold in chemists' shops. The Association fixes prices for the manufacturer, for the wholesaler, and for the retailer. Those dealing in the articles concerned sign an agreement to adhere to these prices and supplies can be withheld from anyone selling at less than the fixed price.*

Clothing. In the clothing trades it may generally be said that competition remains the dominant factor. Though there have been very large amalgamations among the big stores retailing clothing, market control in the strict sense may be said not to exist in the clothing trades. One feature of the boot and shoe manufacturing industry may, however, be mentioned. Practically all manufacturers are members of the Incorporated Federated Associations of Boot and Shoe Manufacturers, but this body does not control prices or output, though it arranges and regulates national terms of trade and conditions of sale. A very large proportion of the members of the Federation lease boot and shoe-making machinery from the British United Shoe Machinery Company, which is a subsidiary of the American United Shoe Machinery Company. The Company refuses to sell its machines, over which it has a monopoly based on possession of patent rights, and it agrees to lease the machines only on conditions aiming at the suppression of the use of machines of other makes.

Miscellaneous Industries. While the foregoing paragraphs describe shortly the state of affairs in the selected exporting group of industries,† there are in Great Britain a number of interesting examples in other trades both of terminable associations and of trusts.

Dealing first with *terminable associations* a highly organised "cartel," known as *Associated China Clays, Limited,* was formed shortly after the war. This was a selling agency representing sixty-two producing companies, who were the shareholders in it and who

* The example of this Association has prompted the establishment of a similar organisation to deal with proprietary articles in the grocery trade.

†See page 1.

agreed to sell the whole of their output to it. It graded clay, fixed the prices and decided how much each shareholder should produce. If a shareholder produced more than his quota the company paid only half the price for the excess and the other shareholders participated in the profits of the sale of the excess. This organisation, it will be seen, was a cartel on the German model. In 1924 some large producers became discontented with the arrangement, which then came to an end. A number of the biggest firms, however, and some small ones formed a new association on similar lines, entitled China Clay Producers, Ltd. This was mainly concerned with the production of best clays, though its members produced also common clays. In the *pottery* industry associations exist in practically every branch, which control selling prices of such articles as are of common design and use. In 1921, 60 per cent. or more of the output of such articles was controlled by these associations. In the *glassware* trade there are in the domestic glassware section two associations which represent a combination of interests on the part of the manufacturers concerned; and both of these associations regulate selling prices. In the *match-making* industry, an association was formed in 1907 to regulate prices and conditions of sale, and to work a pooling arrangement of the usual type. It did not include firms acting as Swedish or other foreign agents or those believed to be under Swedish influence. After enquiry under the Profiteering Act it was reported in 1920 that prices had become a matter of agreement between the manufacturers, but that it had not been found practicable to make the observance of those prices binding conditions of sale as there appeared to be considerable jealousy between the various manufacturers, especially between those who manufactured only and those who did an import trade as well. A consolidation of interests among British manufacturers has taken place of recent years, Messrs. Bryant & May having acquired a number of match factories. The company are said to maintain friendly relations with the Swedish Match Trust. The *United Vinegar Producers* is an association controlling rather more than half the total output of brewed vinegar. It fixes prices which are adhered to by all the members and which are the basis of prices quoted even by firms who are not members of the association.

Turning to the subject of *trusts*, large organisations meriting that description exist in connection with the manufacture of glass bottles, seed crushing, soap manufacture, the tobacco industry, the distilling of spirits and the production of yeast. The *glass bottle* industry offers an example of an economic power based on possession of patent rights in the Owens automatic glass bottle making machine. In 1907, a price-fixing association was formed which covered practically all the manufacturers in Great Britain, and later a company, in which practically all the members of the association were interested, was formed to acquire the British rights in the Owens machine from the German company holding the patent rights. Further consolidation

took place in 1912 on the formation of United Glass Bottle Manufacturers, Limited, an amalgamation which represented some 60 per cent. of the original price-fixing association and 50 per cent. of the shares of the patent-holding association. In 1919, a new company, known as British Glass Industries, Limited, was formed. This company acquired a number of glass works and finally absorbed United Glass Bottle Manufacturers, Limited, thus obtaining control of the patent-holding company. The Sub-Committee appointed under the Profiteering Acts found in 1921 that British Glass Industries, Limited, was in a position to exercise a considerable influence with regard to prices, and a fear was expressed lest the high capitalisation of the company should encourage it to keep prices unduly high. The company was subsequently reorganised as a holding company and has since been reconstructed. The international agreement existing in the industry will be described later (see page 112).

In the *seed crushing* industry a predominant position is occupied by British Oil and Cake Mills, Limited, which was registered in 1899, and which has taken over the businesses of most of the leading companies of oil and cake manufacturers and oil refiners.

In the *soap* industry an association regulating the price of household soap had been established so long ago as 1867, and another regulating the price of toilet soap in 1911. In 1914 the United Kingdom Soap Manufacturers' Association was formed, and price-fixing became more systematic. The association, which had a membership of ninety soapmakers, representing about 80 per cent. of the total output of the two hundred and twenty soapmakers in the country, fixes both the manufacturers' price and the retail minimum price. These, as a rule, are followed by manufacturers outside the Association, with the exception of the Co-operative Wholesale Society. The association is dominated by Messrs. Lever Brothers, Limited, who produce 90 per cent. of the production of the Association and 75 per cent. of all the soap made in this country. The firm started in 1886 and by 1923 possessed an interest—usually a controlling interest—in some 150 associated companies in various parts of the world, of which about forty made soap. While the Company is thus in the position of a trust in so far as the soap trade in Great Britain is concerned, it has gone a considerable distance in the direction of becoming a vertical combination controlling everything necessary to the production of soap. Thus, the company owns plantations and is interested, *inter alia*, in shipping, whaling, seed crushing, oil refining, and fisheries, as well as in the production of soap and its bye-products. The soap industry provides consequently another example of a price-fixing association dominated by one huge organisation.

In the *tobacco* industry the Imperial Tobacco Company was formed in 1901 to defend British tobacco manufacturers against an invasion of American brands. The international agreement reached

as a result of the struggle between the Imperial Tobacco Company and the American Tobacco Company will be referred to later (see page 114). The Imperial Tobacco Company, which provides something like 60 per cent. of all the tobacco consumed in this country, not only fixes minimum prices at which its goods are to be sold, but also controls a firm of multiple retailers and has taken special steps by the provision of bonuses to ensure that its goods are given preferential window displays by retailers. As 40 per cent. of the trade is outside its control, its influence over the market is not absolute, but it is nevertheless extremely powerful.

The production of *whisky* has since 1925 been almost entirely in the hands of the Distillers' Company, Limited. The company was formed in 1877, and at various dates it acquired a controlling interest in other businesses in the industry. In 1925 it obtained control over the two remaining large undertakings in the industry, by means of an exchange of shares. By the acquisition of competing companies in 1921 and 1922, the company had already established something approaching a complete control over the making of *yeast*.

Mention should also be made of the *Shipping Conferences*. Towards the end of the nineteenth century, in consequence of much new competition and resulting low freights, the owners of vessels trading on certain routes formed conferences in order to fix agreed freight rates. In order further to prevent the incursion of new lines and tramp steamers a system of deferred rebates was gradually evolved by the conferences, whose members thus tie their customers to them. The recommendations resulting from two enquiries into the working of the conferences are referred to later (see page 88).

The question of combinations in the various sections of the *building materials* trade formed the subject of enquiry not only by the Committee on Trusts in 1919, but also, subsequently, by various bodies examining the housing problem. It is, consequently, not proposed to describe the position here, but it may be mentioned that the Committee on Trusts found that an analysis of the building costs of a number of groups of typical cottages showed that on the average the prices of 42 per cent. of the materials used were uncontrolled ; 33 per cent. were controlled partially by associations, and 25 per cent. completely controlled Similarly, it is not proposed to deal here with such organisations as the Grocery Articles Trade Association, or United Dairies, Limited, and the National Federation of Dairymen's Associations in connection with the milk trade, nor with the question of rings and combines in connection with the importation of meat. Detailed information as to the organisation and activities of combinations in these trades has been disclosed by the enquiries of the Committee on the Distribution and Prices of Agricultural Produce, 1922–23, the Royal Commission on Food Prices, 1925, and the Food Council.

Official Enquiries Regarding Trusts and Combines.

During the present century a number of recommendations bearing on the question of public policy towards trusts and combines have been made by officially appointed commissions and committees, which approached the subject from various angles. Some were concerned only with particular trades and others with methods of assisting the manufacturer or the trader, while the enquiries made under the Profiteering Act of 1919 had regard primarily to the consumers' interest, and the Committee on Trusts of 1918 considered the problem as a whole.

The Royal Commission on Shipping Rings was appointed in 1906 to enquire into the operation of shipping rings or conferences generally, and more especially into the system of deferred rebates. It reported in 1909, the main recommendations of the majority being, briefly, that associations of merchants and shippers should be encouraged in order to bargain with the shipping conferences; that the Board of Trade should be empowered to appoint arbitrators in cases of differences between associations of shippers and the shipping conferences; that the Board of Trade should be empowered to investigate complaints and publish reports thereon if necessary, and that the shipping conferences should be required to deposit confidentially with the Board of Trade information as to conference agreements and rebate systems. The minority report proposed to give the Board of Trade wider powers of enquiry and to impose more stringent requirements as to publicity. No action was taken by the Government upon the report. The question was also examined with regard to inter-Imperial trade routes by the *Imperial Shipping Committee*, who made a unanimous report on the subject in 1922. Briefly, the finding of the Committee was that in order to provide regular, frequent and efficient steamship services, together with stability of freights, equality of treatment and abstention from shipment on the shipowners' account, the conference system must be accepted as a necessary concomitant of modern commerce; and, further, that it is necessary for the Conference to have some assurance of continuous support from shippers such as will constitute an effective method of preventing intermittent and irresponsible competition for berth cargo by outside ships. As regards the tie to be adopted, the Committee recommended that an option should be given between the deferred rebate system and the agreement system, such as had replaced deferred rebates in the South African trade. Under this system, shippers agree to give their entire support to the regular lines in the Conference, while the lines undertake to maintain regular sailings, stability of freights and equality of rates.

As no details have been given in this memorandum of combinations connected with the importation of meat, it is only necessary here to mention shortly that a Departmental Committee was appointed to ascertain the facts as to such combinations in 1908, and that an

Inter-Departmental Committee on Meat Supplies was appointed in 1919 and recommended the establishment of a system of licences in order to provide a method of checking practices in the meat trade inimical to the public interest. No such system, however, has been put into operation.

Departmental Committees were appointed by the Board of Trade in 1916 to consider the position of various industries after the war, especially in relation to international competition, and to report what measures were necessary. The Committee on the *Iron and Steel Trade* were impressed with the contrast between the individualistic and relatively inefficient industry of this country and the highly efficient iron and steel industries of Germany and the United States, where immense concentration of capital was the normal form of organisation. The Committee accordingly recommended that an organisation of British manufacturers be formed for the purpose of obtaining adequate supplies of suitable iron ore ; that a national selling organisation be formed to market British iron and steel products ; and that British iron and steel manufacturers be urged to form combinations for the purpose of laying down large and well designed new units, financial aid being given by the Government if necessary. The Committee on the *Electrical Trades* commented upon the lack of organisation of British manufacturers as contrasted with the German interests, helped by a close connection with the banks and by support from the Government ; and concluded that only by the creation of strong combinations would it be possible for Great Britain to compete. The Committee on the *Engineering Trades* also emphasised the distinction between the looseness of British organisation and the high degree of organisation in Germany and the United States ; and, having recorded its approval of trade combinations, the Committee expressed a desire to see a considerable extension of combined working between manufacturers in Great Britain. The Committee considered that all trade combinations should register their terms at the Board of Trade, not so that they should be made public, but in order that the Government might be kept informed as to what was proceeding in the trade of the country. The Committee on *Shipping and Shipbuilding* recorded their view that the future of the nation depended to a large extent on increased co-operation in the great industries severally, and also amongst them collectively. The Committee on the *Textile Trades* found that in the staple branches of the cotton industry, and to a lesser degree in the woollen and worsted and the jute industries, the advantages of specialisation and large scale production were fully reaped ; but that in the lesser textile industries, e.g. silk, cotton hosiery and lace, there was a large number of small manufacturers, each making a small quantity of a multiplicity of articles and all making more or less the same articles. The Committee thought much might be done in the interests of efficient production by the amalgamation of the smaller concerns.

The Committee on Commercial and Industrial Policy after the War was appointed in 1916 and reported in 1917. It had before it the recommendations made by the Departmental Committees to which reference has just been made. In dealing with the subject of combinations, the Committee came to the conclusion that individualistic methods should be supplemented, or even entirely replaced, by co-operation and co-ordination in respect of production, marketing, and the security of supplies of materials. They felt that such a development was not only desirable in some cases, but practically inevitable under modern conditions. Their view was that, whilst it would be inexpedient for the Government to enter upon a policy of positive control of combinations, some means should be devised for securing to a responsible Government Department adequate information as to their formation. The Committee accordingly recommended that all international combinations to which British companies are parties should be registered at the Board of Trade by the British persons concerned; that it should be optional for the parties to any combination or agreement among British firms, having for its object joint marketing or the regulation of prices or output, to register it at the Board of Trade; and that the Board of Trade should have power to call upon individual consolidations or combines for such information as it might require for its confidential use.

The *Committee on Trusts* was appointed in 1918, in view of the probable extension of trade organisations and combinations, to consider what action might be necessary to safeguard the public interest. The Committee reported in 1919, recommending that it should be the duty of the Board of Trade to obtain information as to the development of organisations having for their purpose the regulation of prices or output in so far as they tended to the creation of monopolies or to the restraint of trade; and that the Board of Trade should present an annual report to Parliament upon the nature, extent and development of such forms of organisation. The Committee suggested that it should be the duty of the Board of Trade to make enquiry into any complaint with regard to the action of such organisations, and that, if *prima facie* evidence was found that the public interest was adversely affected, the Board of Trade should be empowered to refer the matter to a standing tribunal. This body, the Committee proposed, should have power to make an order, on the application of the Board of Trade, calling upon organisations to furnish the Board with information, to investigate, on reference from the Board, the operation of any organisation complained of, and to publish the relevant facts. Finally, the Committee suggested that it should be the duty of the Board of Trade to make recommendations as to State action for remedying any grievances which the tribunal might find to be established.

The Profiteering Act, 1919, together with subsequent amending Acts represents the only legislative attempt made in this country to enquire into or check the operation of trade combinations generally.

The Act was a temporary measure passed in consequence of widespread complaints of unreasonably high profits being made in the conditions of disturbed trade and world shortage of commodities which resulted from the war. By it the Board of Trade were empowered to investigate prices, costs and profits at all stages, to investigate complaints, and, if satisfied that an unreasonable profit had been made, to declare the reasonable price and order the seller to refund any amount paid in excess of such reasonable price. Further, the Board were given power to take proceedings against the seller. These powers were exercised by the Board of Trade through a Central Committee, which dealt with the transactions of wholesalers or manufacturers that affected whole trades or industries, and through Local Committees, appointed by local authorities, to deal with the smaller transactions of retail trade. A great number of complaints were received by both the Central Committee and the Local Committees, the large majority of which were dismissed, but some few prosecutions were instituted and a number of convictions obtained. These provisions of the Act, however, were applied to traders generally without any special relation to the action of combinations or to the exercise of monopolistic influence. The section of the Act which is of interest from the latter point of view is that which, in accordance with the recommendations mentioned above of the Committee on Trusts, charged the Board of Trade with the duty of obtaining from all sources information as to the nature, extent and development of trusts and similar combinations. In practice this duty was carried out by a Standing Committee of the Central Committee just mentioned, which was known as the "Standing Committee on Trusts." The Act, it is important to note, conferred no powers under which coercion could be exercised on a trade combination, except in so far as it brought itself within the penal clauses of the Act by charging unreasonably high prices. The Standing Committee on Trusts appointed numerous sub-committees, which conducted investigations into the extent and development of trusts and combinations in various industries and services.* After

* The investigations by the Standing Committee on Trusts, on which reports have been published, are :—

Dyes and Dyestuffs.	Dyeing, Finishing, Bleaching and Printing.	Explosives.
Electric Cables.	Electric Lamps.	Fixed Retail Prices.
Farriery.	Fish.	Iron and Steel Products.
Fruit.	Glassware.	Milk.
Laundry Prices.	Meat.	Road Transport Rates.
Oils and Fats.	Pipes and Castings.	Soap.
Salt.	Sewing Cotton.	Vinegar.
Tobacco.	Uniform Clothing.	
Yeast.		

Reports published jointly by the Standing Committee on Trusts and the Standing Committee on Investigation of Prices are :—

Bricks, Cement and Mortar.	Dyeing and Cleaning.
Light Castings.	Stone and Clayware.
Slates and Roofing Materials.	Timber.

renewal on two occasions, the Profiteering Act was allowed to lapse in May, 1921. Consequently there is now no general power in existence in Great Britain either directed towards the control of the operations of trusts and similar combinations, or charging a Government Department with the duty of obtaining information as to their development.

There are, nevertheless, a few instances of the State making arrangements to prevent an abuse of power by public utility undertakings. An outstanding example is the sliding scale in connection with the supply of gas under which dividends payable by the larger companies vary around a standard dividend inversely with (though not in exact proportion to) the variations in the price of gas around a standard price. By legislation passed in 1925, the principle of a sliding scale of price and dividend has been applied to the London electric supply companies. The State has always reserved to itself some control over the charges of railway companies, and also over the operations of electricity undertakers, the control affecting the finances of such undertakings relating to such matters as maximum prices, forms of account, sanctions to borrowing in the case of local authorities and special audit in the case of companies. Similarly, the Electricity (Supply) Act, 1926, makes provision in regard to the borrowing of money by and the audit of accounts of the Central Electricity Board which is to be established. With regard to large organisations other than public utility undertakings, it may be mentioned that in the case of two large companies which were formed during or soon after the war, viz. the British Dyestuffs Corporation Ltd., and Nobel Industries Limited, provisions were inserted in the articles of association requiring in both cases that fair prices should be charged and in the case of the Dyestuffs Corporation that equitable distribution should be made. Powers of intervention were also conferred on the Board of Trade in default of compliance. In the case of Nobel Industries, the provision in question was required by the Government to be inserted as a condition of permission being granted to make an issue of capital at a time when the capital market was controlled by the Treasury. The British Dyestuffs Corporation was formed under Government auspices, and the clause was inserted at the wish of the Government.

Germany.

Circumstances of Development of Combinations.

During the latter part of the nineteenth century the tendency towards industrial combination and monopoly became marked in Germany, where rapid industrial development took place at that period. There was no German equivalent of the English common law doctrine regarding the non-enforceability of contracts in restraint of trade, and the courts almost invariably upheld the validity of

agreements to form trade associations and agreements between associations. There were, however, sections of the Penal Code prohibiting extortion and imposing penalties on persons obtaining pecuniary advantage disproportionate to the service rendered; while the Civil Code, after 1909, provided that whoever in business affairs committed acts repugnant to good morals (gutten Sitten) might be subject to an action to desist therefrom and to pay damages. These provisions, with certain others, helped the courts to check some grave abuses connected with trade associations, but they provided no restraint upon the formation of associations and they were not effective for the regulation of prices. Thus, German law was distinctly favourable to the formation and development of trade associations. The attitude of the German Government was also in general favourable, the tendency being to regard trade associations as a necessary part of the national industrial organisation.

The position in Germany in regard to coal and iron was, and remains, essentially different from that in Great Britain. The production of coal being largely centred in the Ruhr district and in Silesia, the establishment of systems of control was made relatively easy. The position as to iron ore was somewhat similar since, in spite of a certain amount of imports from Spain and Sweden, German iron and steel industry in the Ruhr area has been largely based upon the minette ore from Lorraine.

Germany having been a protective country throughout its industrial development, the tendency to combination has received such encouragement as may be derived from the existence of a tariff, thus providing another difference between German conditions and those of Great Britain. The German tariff, however, was moderate as compared with that of the United States, and the influence of the tariff differed in degree between these two countries also. As to the influence of the relations between industry and the transport interests, the fact that the Prussian railways were owned and operated by the State, which pursued a definite policy of encouraging industry, and in particular the export trade, probably encouraged manufacturers to form associations with a view to joint bargaining with a single transport interest.

In considering the growth of trade organisations in Germany, it is essential to remember that the Government and the banks were much more directly concerned in Germany with the encouragement of industrial development generally, and in the pushing of export trade in particular, than was the case in this country. As has been mentioned, the formation of trade associations in Great Britain developed rapidly when traders were brought into more frequent and intimate relations with the Government during the war, and it is reasonable to suppose that a similar effect was produced in Germany before the war.

Types Evolved.

One type which became important was the "participating carte" with attached "syndicate," i.e. a joint selling organisation which fixes and maintains prices and allots the participation of each independent producer in the aggregate output. There existed cartels of this sort in German industry so far back as 1870, and their number and importance increased greatly during the following decades. An enquiry undertaken by the Ministry of the Interior in 1905 established the fact that there were nearly 400 cartels of all kinds then in existence, but many of these were less highly organised types, the word "cartel" being used to signify any terminable association of manufacturers or traders aiming at some degree of market control in the sale of their goods. Highly organised cartels became, however, a distinctive feature of German industrial organisation inasmuch as they dominated many of the most important branches of industry, including those of coal and iron. Partly on account of their firmer legal basis, partly on other grounds, the German cartel tended before the war to be much more powerful and more widespread than its counterpart in this country—the terminable trade association. The comparative position as between Germany and Great Britain in this respect since the war remains approximately the same. In both countries the war emphasised the importance of the cartel as part of the national economic organisation, and a substantial increase took place in their number. The stabilisation of the mark towards the close of 1923 was followed by a sharp decline in the number of cartels. This, however, was little more than momentary, for in the autumn of 1924 a tendency to revive and reform them manifested itself, and this tendency spread rapidly during 1925 and 1926. Under conditions of acute depression and intense competition the revival of cartels was found to be imperative in most industries.

In addition to the multiplication of cartels and associations, the tendency to concentrate control in a few hands had made considerable progress in Germany even before the war, partly through the more efficient undertakings within a cartel buying up less efficient works in order to obtain their rights of participation. This process, noticeable both between businesses producing the same commodities and between businesses in successive stages of industry, has resulted in the formation of big groups of business interests commonly known in Germany as "Konzerne." The term includes groups bound together in various ways, e.g. by an "Interessengemeinschaft" (constituted when two or more companies agree to pool profits and distribute them in certain proportions), by exchange of shares between companies, by interlocking directorates, or by the leasing of works by one company to another. The formation of Konzerne became very prominent during the inflationary period, when businesses were bought up without much reference to the question whether they would usefully work together. The turn-over tax is

said also to have acted as an encouragement to vertical combination, since the latter offered a way of avoiding the sale of goods (and consequently the tax) at each stage of production. Although some of the more spectacular of the vertical concerns created during the inflation period have since collapsed, concentration has continued apace during the past two years, mainly on horizontal lines. Gigantic trusts of a size previously unknown in Germany have been formed in the heavy iron and steel industry and in the chemical industry, and these are merely prominent examples of the process of reorganisation which is taking place in many other industries. The establishment of trusts more or less on the American model is one of the most significant developments in German industry to-day.

The motives generally underlying this reorganisation are summed up in the word "rationalisation." Comprised within the meaning of this expression are such ideas as the reduction of the number of types to be produced through a process of standardisation or simplification; mass production in the most efficient works and scrapping of inefficient works; elimination of redundant organisation whether in production or distribution; economy in transport through delivery from nearest works; and economy in the use of working capital.

The formation of trusts has been facilitated by the German Government through a temporary reduction of the stamp duties payable in respect of fusions, the amount having been previously regarded as prohibitive when a very large capital was concerned. (See also the section below on "Official Action" on pages 99-101).

Circumstances of Individual Industries.

Coal.—As far back as 1878 there existed combinations of certain of the more important groups of German mines for the purpose of combating over-production and controlling prices. Following some earlier associations dating back to 1882, the Westphalian Coke Syndicate was formed in 1890, and in 1893 the Rhenish Westphalian Coal Syndicate, which eventually absorbed the Coke Syndicate and the Briquette Selling Association. Consequently by 1914 the Rhenish Westphalian Coal Syndicate had become one of the most powerful monopolies in the world. It was a cartel of the most highly organised type, with a system of "participations" for the various members, price fixing and pooling arrangements, and a joint selling agency. The position of the Syndicate was seriously weakened in the period following the end of the war, not only through the collapse of the mark and the invasion of the Ruhr but also through divergence of interests as between members engaged solely in the coal trade and those whose collieries were integrated with iron and steel works. This had been a growing difficulty before the war and had threatened to wreck the syndicate at the expiry of the agreement in 1915. A breaking up of the syndicate could not, however, be allowed during the war, and the agreement was renewed under pressure from the Government.

In October 1924, failing agreement between the "pure" and the "mixed" firms, the Rhenish Westphalian Coal Syndicate was reconstituted by compulsory decree of the Government for a provisional period of five years.

Iron and Steel—A number of sectional associations controlling prices and output had existed in the German iron and steel industry for many years previous to the foundation in 1904 of the Stahlwerksverband. This in some ways was as powerful a monopoly as the Coal Syndicate, whose form of organisation it strongly resembled, but it found great difficulty in carrying its organisation beyond the simpler standardised products, such as sections and rails. Indeed, in 1912 its scope was reduced to cover only these so-called "A" products. It was not renewed in 1919 owing to the steel scarcity then prevailing, but a body called the "Stahlbund" was set up to deal with certain products. This organisation, however, soon ceased to be a syndicate and became merely an association for the exchange of views and experiences. With the re-formation of the Coal Syndicate in the autumn of 1924, and consequent upon the depressed state of the iron and steel industry, there arose an urgent demand for the revival of a steel syndicate which could reduce cut-throat competition; and the Rohstahlgemeinschaft was formed. This covered ingot steel only, and included 95 per cent. of the entire steel output of Germany. It allowed the formation within its compass of special associations for semi-manufactured products, and a number of associations dealing with the principal products have since been incorporated. A new Stahlwerksverband has thus been brought into existence. As, however, many of the big "Konzerne" have in the last few years created their own selling organisations, the new cartels aim only at regulating the output of the industry, fixing quotas for the various producers and allocating orders accordingly. They make no attempt to interfere with selling arrangements. Their position, however, has been very considerably altered by the formation in May, 1926, of the Vereinigte Stahlwerke Aktien Gesellschaft, which represents a fusion of six of the largest producers, the Gelsenkirchen, Deutsch-Luxemburg, Bochum Steel, Rhenish Steel, Phoenix, and Thyssen Companies. It is noteworthy that Krupps did not come in. Since its formation, this trust has purchased a number of independent undertakings, thereby increasing its quota participations in the cartels. On 1st July, 1926, its participation in the Pig Iron Syndicate was 48·9 per cent., in the Rohstahlgemeinschaft 46·8 per cent., and in the "A" Products Syndicate 49 per cent. The trust is said to aim at gaining control over the Rohstahlgemeinschaft. As, however, 75 per cent. of the votes are necessary to support binding decisions, further important absorptions are clearly requisite if the end in view is to be attained.

Engineering and Shipbuilding.—Previous to the war, the engineering trade was controlled by a number of joint selling organisations of the cartel type, but in recent years it has been so much affected by

the formation of large groups of undertakings and has thus become so intimately connected with the great steel-producing organisations, that the policy adopted by those organisations has become very largely the controlling factor in the activities of the engineering industries themselves. The effect upon this industry of the recently formed steel trust remains to be seen. At a meeting of representatives of German shipbuilding yards held in Berlin in November 1925, to consider the difficulties with which the industry was contending, it was agreed that the shipbuilding industry is one which does not lend itself to a concentration of interests in the form of a trust, syndicate or cartel, as such close combination might constitute a danger to the progress of the industry and its ability to compete in the world market.

Electrical Industries.—In the electrical industries, combination took the form of concentration in large groups of undertakings, rather than of cartels the latter being regarded as unsuitable for this industry. The Allgemeine Elektrizitäts Gesellschaft (known as the A.E.G.) and the Siemens Schuckert concern between them controlled some 80 per cent. of the whole industry before the war. The A.E.G. controlled about 45 per cent. and the Siemens Group 35 per cent. Negotiations with a view to the fusion of the two groups are stated to be in progress.

Textiles.—Until the last few years prior to the war cartels were comparatively uncommon in the textile industries, owing probably to the diversity of the products and the large number of small producers in the industry. The position of many branches, however, became very unfavourable, and immediately before the war the cartel movement among producers of textiles made very great strides. This development took the form generally of cartels regulating output and fixing prices rather than of complete syndicates. During the period of inflation, however, there was an important movement in the direction of the formation of Konzerne such as the Blumenstein, Siemen and Hammersen groups, which amalgamated numerous enterprises at different stages of production, including clothing factories and even wholesale trading interests. Since the currency was stabilised there has taken place a certain unloading of businesses previously purchased.

Concentration of production has, however, quite recently increased in the artificial silk industry, the Vereinigte Glanzstoff Fabriken A.G. combined with the J. P. Bemberg A.G., securing control of more than 50 per cent. of the output. The group was subsequently joined by Courtaulds. Another large group in the artificial silk industry is represented by the Köln Rottweil A.G.

Chemicals.—In the German chemical industry before the war there existed a very large number of cartels, and many hundreds of products were subject to agreements, with the result that some of

the large chemical works were members of dozens of cartels of one sort and another. Generally speaking, these associations were, and remain, of a somewhat loose character and have not always been of a permanent kind.

An outstanding feature in recent developments is the formation of a trust comprising practically the whole of the dyestuffs and related industries. Since 1904 the industry had been organised in two principal groups of companies, and in 1916 the two groups (together with two outside companies) formed an Interessengemeinschaft for a period of 50 years. In 1925 it was decided to substitute for this form of organisation a closer union. It was felt that economies could be effected by abolishing duplicate organisation and by "rationalising" production. Retaining the old name, the new trust was known as the "Interessengemeinschaft Farbenindustrie Aktiengesellschaft." Its capital was 652 million marks in ordinary and preference shares. The process of formation was that one of the companies—the Badische Anilin und Sodafabrik—increased its capital and exchanged shares with the other companies.

In the potash industry, cartels have been in existence since 1879. In 1910, when a breakdown of the cartel was threatened, the State intervened and by legislation established a compulsory syndicate. The syndicate as at present organised rests upon a special Act of the German legislature of 1919. Every producer is required to be a member and to hand over all the potash produced to the syndicate. Within the syndicate there are two large groups, viz., the Wintershall concern, which controls about 40 per cent. of the output, and the Vereinigte Kaliwerke company (formed recently to counteract the influence of the former concern), with a participation of 52·2 per cent. The latter thus has a majority vote in the syndicate. It is of interest to note that consolidation has been proceeding within the Wintershall concern, which is being organised on the same lines as the dyestuffs trust. The international agreement between the German and Alsatian syndicates is referred to below (see p. 112).

Miscellaneous Industries.—Industries, other than those mentioned above, in which associations are very widespread, are the brick and tile industry, the cement industry, the glass industry, pottery, paper manufacture, woodworking, and the working of non-ferrous metals. In the foodstuffs industry the number of cartels has not been considerable, but the salt and brewery associations are both powerful and of long standing. The development of associations has been smallest in the case of agriculture, in connection with which large cartels have arisen only in the sugar and spirit industries. The process of forming large business groups has extended to many industries other than those which have been specifically mentioned. In the foodstuffs industries, the principal sugar manufacturers of South Germany have combined in the Süddeutsche Zucker A.G. of Mannheim; the millers of the Berlin district have formed the Betriebsgesellschaft Berliner Mühlen; and the principal margarine

manufacturers have formed an Interessengemeinschaft. Important Interessengemeinschaften have been concluded in the optical and photographic industries and in the linoleum industry. In the match industry the independent German firms and the factories belonging to the German Co-operative Wholesale Society have reached an agreement with the Swedish Trust (which controls factories in Germany) under which a company to be known as the Zündholzvertriebs A.G. will be formed to sell the output of all the factories. An interesting feature of the agreement is that the parties have granted to the German Government a voice in the fixing of prices. An important amalgamation by exchange of shares has recently taken place in the Silesian Portland Cement industry. Concentration has also proceeded apace among the smaller engineering works, in the motor industry, and among commercial and shipping firms.

An illustration of the increased tendency to co-operate in the shipping world is afforded by the arrangements recently made between the Hamburg America Line and the North German Lloyd with a view to excluding competition. The arrangements relate to interchange of steamers, the institution of joint passenger agencies, etc. It may be added that the North German Lloyd in 1925 obtained control over three other lines—the Roland Line, the Hamburg Bremen Africa Line and the Reederei Horn; while in 1926 the Hamburg America Line obtained control over the Deutsch-Austral and Kosmos Shipping Companies.

Official Action Regarding Trusts and Combines.

As has been stated above, the German Government before the war on the whole looked favourably upon the formation of associations, and even—in the case of the Potash Syndicate—secured by legislation the renewal of a cartel. After the war, however, there was a widespread change of public opinion towards trusts and cartels, due apparently to the belief that they made for higher prices. In July, 1922, an Advisory Committee on Cartels was constituted by the Ministry of Economic Affairs; and in October, 1923, the Government issued a "Decree against the abuse of economic power." Under this decree a Cartel Court was established with exclusive and final authority in regard to the matters entrusted to it, and consisting of a judge appointed by the President of the Reich, and of four assistant judges appointed by the President of the Industrial Court. The decree laid down that every agreement controlling supplies and prices must be in writing; that, if such an agreement is detrimental to the public interest (particularly if supply or demand are restricted in a manner not economically justifiable, if prices are raised or kept high, or economic freedom is unreasonably restricted by boycott in buying or selling or by discrimination) the Minister of Economic Affairs may apply to the Cartel Court to have the agreement declared void, or may issue an order to the effect that any party to the agreement may terminate it. The Minister may

also order copies of all agreements to be sent to him, in which case they can only be put into operation after the Minister has received the copy; and in the event of an agreement being declared void, the Minister may require all future agreements to be submitted to him for his approval. Further, if the Cartel Court, on application from the Minister of Economic Affairs, considers that the public interest is being injured by an exercise of economic power, it may make a general order allowing withdrawal from all contracts included under the condition in question. The Court was further empowered to hear applications from members of cartels for permission to resign from the Cartel without giving notice.

Although three years have passed since the Decree was promulgated its effects cannot yet be fully judged. It is true that the Cartel Court has dealt with a large number of cases in which members of Cartels have sought to resign, and the conditions which must exist for permission to be granted may be regarded as to a certain extent defined. For example, withdrawal has been permitted in cases where it has been shown that the Cartel is dominated by and run in the interests of a powerful "Konzern," or where a Cartel has endangered the existence of smaller members by failing to make an attempt to meet changes in the business situation by altering its terms or conditions of contract. It has been held also that a change in the business situation does not itself provide an adequate reason for resigning from a cartel. Up to the middle of 1925, about 160 of these cases had been dealt with. Of these, 40 were settled by agreement between the Cartel and the dissatisfied member, while of the rest about half were decided in favour of the applicants and the remainder in favour of the Cartel.

This procedure before the Cartel Court on private initiative was not regarded as the main object of the Decree, and it is said in fact to have been included as a compromise with those who wished to proceed on different lines. The results are considered by some to justify the procedure as a method of controlling Cartels in the public interest. Others, however, maintain that the procedure merely provides a method by which disloyal members of cartels may obtain the advantages of the cartel without helping to carry the burden.

For nearly two years after the Decree came into force the German Government itself proceeded with great caution in making use of the powers granted to it. It refrained from taking action in the Cartel Court, and confined itself to unofficial intervention under a section of the Decree which provides that the Minister of Economic Affairs may in suitable cases take proceedings in the first instance before approved courts of arbitration established in connection with trade organisations. Such courts had been established at the Central Associations of Industry, Wholesale and Retail Trade, and the Co-operative Societies. As the proceedings in these unofficial cases have not been published it is not possible to gauge their importance.

In August, 1925, the German Government, as part of a scheme for bringing about a reduction of prices, announced its intention of making a more rigorous use of its powers under the Decree, and in particular of taking proceedings in the Cartel Court against cartels which had the effect of raising or maintaining prices. The Government stated that it would regard various conditions imposed by cartels (including clauses permitting of an upward revision of prices, deferred rebates, clauses relating to prices to be charged in the following stages of production, and clauses relating to reciprocal or exclusive dealing) as being detrimental to the public interest within the meaning of the Decree. In the event of the decisions of the Cartel Court not being sufficiently favourable to its point of view, the Government announced its intention of proposing an amendment of the Decree.

In pursuance of this policy the Government required practically all cartels to furnish particulars as to constitution, membership, prices, etc., so that the activities of each cartel could be scrutinized. In one case at least the Minister of Economic Affairs has made an order (on the ground that excessive prices were charged and that a policy of boycott was being pursued without authorisation) permitting any member to withdraw from the cartel, and providing that resolutions, agreements, etc., of the cartel should become binding only after a copy had been sent to him. In many other cases, the Ministry of Economic Affairs is said to have brought about a reduction of prices or even the dissolution of a cartel.

While the Government is thus taking vigorous action with regard to cartels, it is to be noted that the Cartel Decree provided practically no basis for action against trusts, that is to say amalgamations of businesses. It seems likely that the recent swing of German industry in the direction of the trust form of organisation is not wholly unrelated to the relative freedom of action which the trust enjoys in comparison with the cartel.

France.

Circumstances of Development of Combinations.

In France, associations of producers as well as agreements between them were much less widespread before the war than was the case in Great Britain, Germany or the United States. This was partly due to the law, which on the whole has been antagonistic to combinations. The Penal Code provides that possessors of the same commodity who agree not to sell or to sell only at a certain price, can be punished with fine and imprisonment. The Civil Code lays down that contracts are only enforceable if they are not contrary to law, good morals or public order. In administering the law, the courts have, on the whole, taken the line of tolerating combinations so long as they are not shown to be harmful. It has also been held that a consolidation of competitors into a single company does not infringe the law. Another

reason why the movement towards associations has been comparatively less pronounced in France is that so considerable a proportion of French products are luxury and fancy goods, in connection with the manufacture of which associations do not easily arise, since such goods must appeal to personal taste and consequently do not conform to a type.

Types Evolved

Nevertheless, cartels were formed in France before the war, though they differed from the German type, since in general they had no central selling agency. Each member made his own contracts, but did so within the price and selling limitations of the agreement. Usually production was not limited, but territories were allocated, prices for certain areas fixed and sales limited to the quotas assigned, penalties being imposed for violation. Another form of associated action became common in France. This was the Comptoir, which is an incorporated trading company composed of manufacturers who turn over to it the sale of their products. The Comptoir does not usually agree to sell all that its members can produce, but only up to a quantity fixed in the agreement. The Comptoir then fixes prices and distributes profits to the producers. French industry also contains a few organisations, established since the war, which can be classified as trusts proper ; and there has been a marked tendency in France, as in the other big industrial countries, towards a concentration of control and the formation of large groups.

Circumstances of Individual Industries.

In the *coal mining* industry, which is largely localised in northern France, associations of the participating cartel type existed before the war and are still in being, though to some extent modified by a certain amount of consolidation of concerns. The latter movement, however, has not really been extensive in the industry, possibly because in the devastated areas, where so many of the mines are situated, concessionnaires are prohibited from uniting their concessions with others of the same kind. The *iron and steel* industry was largely covered by associations, chiefly of the Comptoir type before the war, and a steel Comptoir of national scope, and another for sheets and plates, were formed shortly after the Armistice, but they with others in the industry failed to survive the industrial depression, and disappeared before the end of 1922. Throughout the *metallurgical* industry in France the movement in the direction of concentration of control has made great strides during the last few years, and there are now a small number of huge groups controlling the industry from the ore up to the finished products. The interests of these groups extend into the *engineering* trades, but fusion with coal mining interests has not reached the same proportions as in Germany. The great metallurgical and engineering concerns are closely connected with shipbuilding concerns and the latter with the great shipping companies.

In the *electrical* industry four combinations have developed which now dominate the whole electrical manufacturing industry of France. In the *textile* industry there existed before the war cartels among cotton spinners, wool combers, linen manufacturers and silk finishers, while in 1924 a Comptoir was formed in the cotton trade comprising about 154 firms, and covering every stage of production from spinning to the manufacture of ready-made clothing. Its chief aim is said to be the development of the export trade. In the *chemical* trade there were many more or less formal agreements among manufacturers before the war, but concentration has now proceeded so far that two concerns absolutely dominate the heavy chemical industry. The Comptoir, or some form of association resembling it, now exists in a number of other trades, including the *salt* trade and the *petroleum* trade. Concentration of ownership has been noticeable recently in the *dyeing and bleaching* industry, the *light chemical* trade, the *cement* industry, and among the *wine* producers, in addition to the industries mentioned individually. As to trusts proper, two of the most powerful in France are the combine of *paper* manufacturers, and the Compagnie de Saint Gobain, which has international ramifications and is one of the world's principal producers of *plate glass*. The whole of the *aluminium* industry is practically directed by one concern.

United States.

Circumstances of Development of Combinations.

The tendency to limit competition, common to all industrial countries in the latter half of the nineteenth century and since, was particularly marked in the United States. Most of the contributory factors which were noted earlier in this memorandum seem to have been at work in the United States. America offered a home market of enormous capacity, and of singular uniformity as regards the kind of goods required. This facilitated large scale production by machinery, and thus tended to produce that extreme competition which so often leads to agreements with a view to market control. The possibility of "squeezing" relatively weak railroads provided at one time a distinct inducement to combination on the part of trading interests. Later, after the railroads had strengthened their position by combination, traders may have been encouraged to combine in order not to stand at a disadvantage. Further, the great distances both inside America and between America and other industrial countries gave American producers a natural protection from competition, and thus facilitated combination. This influence has been reinforced by the fiscal policy which has on the whole maintained a highly protective tariff.

From the days of the "pools" which sprang up for the purpose of restricting competition between rival producers soon after the Civil War, there has been a persistent movement in the direction of

combination and the limitation of competition in the United States. The history of this development is peculiar in that a very rapid growth of powerful combinations took place notwithstanding strenuous efforts on the part of the legislature and the judiciary to check it. While the growth of such organisations was not prevented, the law exercised a profound effect upon the form which they assumed. It is, therefore, more convenient to study the American development historically rather than to attempt to examine the position of each industry separately, or to trace the development of each form of combination and agreement. The facts are that attempts to form associations and to secure control of the market have been made in practically every manufacturing industry in the United States, while the form of organisation has been continually changed as soon as any particular type was pronounced illegal by the courts.

History of American Developments.

The common law of the United States contains the same doctrine as to the non-enforceability of agreements in restraint of trade as does the English common law, but the tendency in the United States has long been to apply it with greater strictness ; and agreements to form associations and agreements between associations have almost invariably been held to be unenforceable at law. The doubtful position under the common law of the terminable association for fixing prices naturally resulted in the evolution of new forms of organisation, and these, particularly the so-called " voting trust " (from which the word " trust," in its present signification of a large undertaking or amalgamation possessing a considerable degree of market control, was derived) can be found in existence even before 1890, when the legislature took an important step. In that year was passed the Sherman Anti-Trust Act, which prohibited under severe penalties " every contract, combination in the form of trust or otherwise, or conspiracy in restraint of trade or commerce among the several States or with foreign nations." In effect this Act made punishable agreements which under the common law were merely invalid. Even before the Sherman Act was in operation, the " voting trust " form of organisation, by which a number of companies assigned their ordinary stock to a group of trustees who in exchange issued trust certificates and who exercised the voting rights and thus controlled all the companies, had been held by the Courts to be illegal under the common law, and this view was confirmed in 1892 by the Supreme Court in the well-known case of the Standard Oil Trust. The " voting trusts " were accordingly replaced by different forms of organisation.

The interpretation of the Sherman Act gave rise to great difficulty, and its application was far from being as speedy or as effective as was expected. The first question which arose was whether the Act applied to all contracts in restraint of trade, or merely to contracts

in unreasonable restraint of trade. In 1897 the Supreme Court decided that it applied to all contracts in restraint of trade, but in 1911 this decision was reversed. In 1895 in the well-known case of the American Sugar Refining Company, which produced about 65 per cent. of the output of refined sugar, and which had purchased the control of four other sugar-refining companies, the Supreme Court decided that the contracts related exclusively to the acquisition of the Philadelphia Refineries and the business of sugar refining in Pennsylvania, and bore no direct relation to commerce among the States or with foreign nations. The Supreme Court accordingly dismissed the Government's suit to compel cancellation of the contracts as being in restraint of trade.

This decision is said to have been a direct cause of the boom in "trust" formation between 1897 and 1900. It has been estimated that in those years twice as many trusts were formed as during the whole of the eleven years preceding. From those years date some of the best-known trusts; and the movement continued after 1900 on a somewhat smaller scale until 1903, after which date the number of new trusts formed became distinctly fewer. No doubt there were general reasons for this falling off, such as the large mass of securities which the public were being asked to take up, and the failure of some of the trusts formed. It seems, however, that another reason for the slackening in the formation of combinations was the decision of the Supreme Court in 1904, in the Northern Securities case, to the effect that combination of two competing railroads through a holding company was illegal under the Sherman Act.

Prior to this date, the results achieved under the Sherman Act were small, but this decision both necessitated the re-formation of combines organised as holding companies, and revived doubt as to the legality of trusts in general. It led to much greater activity in instituting prosecutions under the Sherman Act. Between 1904 and 1914 a number of important cases were decided. In a suit begun in 1906 and decided in 1911, the Supreme Court ordered the dissolution of the Standard Oil Company then organised as a holding company with 70 subsidiary companies. Dissolution accordingly followed, but the shares of the subsidiary companies were divided up among the shareholders of the Standard Oil Company, so that competition was not restored. In 1911 also the Supreme Court ordered the dissolution of the American Tobacco Company, which likewise controlled a number of subsidiary companies. In this case the Circuit Court was instructed to prepare a plan for dissolving the combination and re-creating a condition in harmony with the law. This was done, but on the whole the scheme was ineffective in restoring competitive conditions. Proceedings were also taken under the Act against such organisations as the Harvester Trust, the National Packing Company ("The Beef Trust"), the so-called Glucose Trust, and the United States Steel Corporation. In the last case the Government's suit

was dismissed on the ground that the Steel Corporation only comprised 40 per cent. of the output. A review of the cases dealt with under the Sherman Act suggests that on the whole, comparatively little success had been achieved by its means in the direction of restoring competitive conditions. In fact by 1912 the decision in the case of the United States Steel Corporation appeared virtually to have legalised combinations which did not control more than 40 per cent. of the output of an industry, while the decision of 1911 as to contracts being legal unless in unreasonable restraint of trade, encouraged the belief that decisions of the courts really depended upon the views of the judges whether a particular trust was advantageous or not, irrespective of the policy laid down by Congress in the Act.

It was in consequence widely felt that the Sherman Act needed strengthening, while in some quarters it was held that a power of dispensation was required to modify the cruder effects of the Act in certain cases. Consequently in 1914 two further acts dealing with the question were passed, the Sherman Act remaining on the Statute Book. The Federal Trade Commission Act established a Federal Trade Commission of five members to be appointed by the President with the advice and consent of the Senate. The Commission, which has a permanent legal and administrative staff, has powers relating to investigation, and to the prevention of unfair methods of competition. As regards investigation the Commission was empowered to investigate the organisation and conduct of any corporation and its relation to other corporations, individuals and associations; to investigate the carrying out of any decree entered under the Sherman Act against a corporation; to investigate the facts relating to any alleged violations of the anti-trust Acts; to make recommendations for the readjustment of the business of any corporation alleged to be violating the anti-trusts Acts; to publish information; and to investigate trade conditions in foreign countries where associations may affect the foreign trade of the United States.

As regards prevention of unfair methods of competition, the Act declared such methods of competition in commerce to be unlawful, and directed the Federal Trade Commission to prevent them. The Commission were to proceed by issuing a complaint against any person who appeared to be using unfair methods of competition, and to appoint a time for an oral hearing. If, as a result of the hearing, the Commission reached the conclusion that the form of competition in question was prohibited by the Act, the Commission could issue an order requiring the cessation of that method. If the order failed to be carried out the Commission might apply to the Circuit Court for enforcement. Alternatively, the party against whom the Commission issued an order might apply to the Circuit Court to have the order set aside.

The second of the two Acts passed in 1914 was the Clayton Act, which required the Federal Trade Commission to ensure compliance with certain provisions. These included, *inter alia*, provisions to the effect that price discrimination between different purchasers was illegal if it lessened competition or tended to create a monopoly; that it was illegal to fix prices, discounts or rebates on the understanding that the purchaser should not use or deal in the goods of competitors; and that a corporation should not acquire the whole or any part of the share capital of another corporation when the effect might be to lessen competition substantially. It also prohibited inter-locking directorates under certain conditions where the effect might be to reduce competition.

It was hoped that these two Acts would check the lengthy process by which combinations merely changed their form as soon as any particular method of organisation was condemned under the Sherman Act. The discouraging experience with that Act is said to have convinced the country that the problem could not be dealt with under the criminal law, and neither of the new acts was a criminal statute. Consequently they marked an important change of attitude towards trusts, since they concentrated attention on objectionable methods of competition used in building up trusts, rather than upon trusts themselves, and aimed at correcting rather than punishing. In order to obtain an impression of the effect of the working of the Federal Trade Commission, it will be necessary to glance at some of the complaints filed and orders made by the Commission.

All the cases heard involved the general provision in the Federal Trade Commission Act that unfair methods of competition are unlawful. The individual cases, however, have involved consideration of the various more detailed provisions of the Clayton Act. For example, an important case was considered in July, 1924, under the section of the Clayton Act regarding price discrimination. This is known as the "Pittsburgh Plus" case, in which the Commission found that the system was illegal under which the United States Steel Corporation and its subsidiary companies quoted prices for products manufactured away from Pittsburgh at a base price plus an amount equivalent to what the railroad charge would be from Pittsburgh to the customer if such products were actually sent from Pittsburgh. The Commission ordered the Steel Corporation to cease from the practice. The Corporation somewhat unexpectedly did not appeal against the order and on the contrary complied with it. A number of cases have been dealt with under the same section of the Act but a practical difficulty arises in cases involving unfair price tactics on account of the delay involved in proceedings through the Commission. The Commission originally took the line that all trade discounts based on a classification of customers on functional lines were illegal, but in the "Mennen" case a decision to this effect was set aside by the Circuit Court, which held that the law only prohibited discriminations tending to injure a competitor or seller, and

not discriminations injurious to the class of purchasers discriminated against. The Commission has issued a number of orders against attempts on the part of wholesalers to direct by concerted effort the channels of wholesale and retail distribution, and in these cases its orders have been very generally sustained by the Courts. A number of cases have been dealt with involving the question of the fixing by manufacturers of the price at which goods sold to retailers are to be resold. The findings of the Commission as reviewed by the Courts are said to have left the law upon this question in a somewhat uncertain state. The commission has also taken up a number of cases in which " tying clauses " were involved, providing for articles being sold with some such stipulation as that they are to be used only in conjunction with accessories or other machinery made by the vendor. In one of these, the system of the United Shoe Machinery Company for leasing boot-making machines was held by the Supreme Court to be illegal under the Clayton Act. An attempt by the Commission to suppress the practice of the Oil Companies of leasing tanks and pumps bearing their name upon the understanding that the retailer would use them only to sell the lessor's brand, ended in failure. No orders have been made by the Commission in regard to interlocking directorates, but a number of cases have been dealt with involving inter-corporate stock holding. In one case, the Aluminium Company of America, which, by purchasing shares in a number of other companies in the industry had obtained a virtual control of sheet aluminium production, was ordered by the Commission to divest itself of the stock, and directed not to sell it to any affiliated person or corporation. The validity of this order was sustained by the courts. Somewhat similar action was taken by the Commission against Armour & Co., Swift & Co., and the Western Meat Company, based in each case upon the acquisition of stock in local packing plants alleged to be competitors.

In surveying, however briefly, the cases dealt with and the action taken by the Commission, it is impossible not to notice the frequency with which its orders have been set aside by the Courts. This appears to have arisen in the main from fundamental differences between the interpretations given by the Courts and by the Federal Trade Commission respectively as to the meaning of the Acts. The Commission seems to have considered that it was intended to use its discretion in deciding what were " unfair methods of competition," while the Courts appear to have taken the view that, as these methods were not defined in the Statute, it was ultimately for themselves to decide what the phrase included. Whatever the intentions of the Acts may have been, there can be no doubt that the attitude of the Courts has greatly restricted the powers with which the Commission supposed itself to be endowed. On the whole, the results of the administration of the two Acts appear to have been somewhat discouraging to those who hoped that they would prevent combination. It may be that the existence of the Commission has had a

considerable indirect influence in preventing the growth of malpractices and in putting business on a higher moral plane, since numerous cases involving deceptive or dishonest practices have been dealt with by the process of complaint and order. Also the powers of investigation have no doubt been influential. It cannot be denied, however, that only a very partial success has been achieved in preventing the growth of combination or the lessening of competition. The experience of the administration of the Sherman Act between 1890 and 1914 seems to have been repeated. When one form of combination is attacked and declared illegal, the lawyers advising the corporation evolve a new form which, even if an objection by the Commission is eventually upheld, takes a considerable period to be upset.

Whatever the effect of the anti-trust laws and the activities of the Federal Trade Commission may have been in exposing malpractices and preventing monopoly, it is indisputable that since the end of the war amalgamations have taken place in many branches of manufacturing industry. These amalgamations have been too numerous to refer to individually in this memorandum. A highly important development is that public opinion is apparently becoming more prepared to admit that there may be advantages in respect of efficiency to be gained from amalgamation and co-ordination. It has already been noted above that the legal position of terminable trade associations has been extremely doubtful ever since the passing of the Sherman Act in 1890. Considerable importance must, therefore, be attached to the passing in 1918 of the "Webb-Pomerene" Act which excepts from the provisions of the Sherman Act associations engaged solely in the export trade. This Act also provided that the requirements of the Clayton Act as to acquisition of stock by corporations should not apply to the ownership of stock in corporations engaged exclusively in the export trade. The Federal Trade Commission was to see that export associations did not infringe the law, and those bodies were required to file their articles of association with the Commission.

Since this change in regard to export associations, there has been, as might be expected, much discussion of the question of permitting associations in the import trade as well. Meanwhile, a decision of the Supreme Court in June, 1925, has materially affected the position of terminable associations generally. This was given in cases brought against the Maple Floor Manufacturers' Association and the Cement Manufacturers' Association and was to the effect that the gathering and dissemination, openly and fairly, by trade associations or corporations, of information as to the cost of their products, the volume of production, prices, stocks, and transport costs, is not unlawful when there is no attempt at concerted price fixing or restraining competition.

The foregoing short description reveals the position in which the question now stands in the United States. It does not appear unlikely that there will be some further change of both legislation and practice in the near future. It is in this connection that the powers of investigation possessed by the Federal Trade Commission and the information so acquired may be expected to reveal their value.

International Combinations.

Cartels and trusts have naturally sought to strengthen their position by agreement or combination with competitors in other countries. As the local and the national organisations had to be built up first, "international" cartels or trusts were, broadly speaking, a late development; but their formation was a marked feature of the twenty years immediately preceding the war.

It has been estimated that there were in existence before the war some 114 international cartels, distributed among the different industries as follows:—Transportation, 18; coal, ores, metal, 26; stones and earth, 6; electrical industry, 5; chemical and allied industries, 19; textiles, 15; stoneware and porcelain, 8; paper, 7; and miscellaneous, 10. Some of these cartels were of limited scope, designed to regulate the relations between industries which had grown up in close geographical proximity on opposite sides of a land frontier; but many were of wider scope. As a rule, the object was the regulation of competition, and especially the exclusion of foreign competition from the respective home markets of the participants. Frequently delimitation or division of sales territory was arranged. In some cases international cartels regulated prices, credit terms, packing conditions, and selling practices generally. Occasionally international cartels provided for exchange of patents or knowledge of technical processes. This was particularly the case where undertakings in different countries were inter-connected on the financial side, as with the electric lamp industry and the explosives industry.

The outbreak of war in 1914 broke up most of the international cartels, but since the close of the war some have been re-formed and others are in process of formation or re-formation. The conclusion of a Continental steel cartel and of a copper syndicate representative of nearly all the principal producers is a development which suggests that the international cartel is likely to be more far-reaching in the future than it has been in the past.

In addition to cartels, a number of powerful international trusts were built up before the war, some of the most prominent being in the petroleum, tobacco, sewing cotton, and non-ferrous metal industries. The last of these—the German-controlled non-ferrous metal trust—was greatly weakened by measures taken during the war to reduce its influence. Since the conclusion of the war some international trusts have considerably increased in power, and an important new trust has arisen in the match manufacturing industry.

The following are a few illustrative particulars relating to prominent international cartels and trusts.

International Cartels.

International Rail Makers' Association.—This is one of the earliest examples of an international cartel, as it dates back to 1884. It was an agreement originally between British, German and Belgian manufacturers engaged in the export trade for the purpose of dividing up export orders and securing immunity from competition in their home markets. The Association broke down more than once, but later became a more permanent institution. In 1904 it was re-formed with the addition of the French producers, and in 1905 United States works became parties to it. Later, agreements were made with Russian, Austrian, Italian and Spanish works. The Association controlled almost the entire international trade in rails. The Association was re-constituted in 1926 with the name European Railmakers' Association, by agreement among the British, German, Belgian and French rail makers. Full particulars as to the provisions of the agreement have not been published.

European Steel Cartel.—This cartel, formed in the autumn of 1926, obviously possesses great potential importance. The agreement is between the French, German, Belgian and Luxemburg steel makers* and provides for the allocation between the four countries of an assumed output of 25,287,000 tons in the following agreed proportions :—France, 31·89 per cent. ; Germany, 40·45 per cent. ; Luxemburg, 8·55 per cent. ; Sarre, 6·54 per cent. ; and Belgium 12·57 per cent. It is provided that these percentages are subject to some modification in the event of the aggregate production rising substantially and in certain other contingencies. The aggregate amount of production will be fixed quarterly. The producers of each country will pay into a common fund $1 per ton of ingot steel produced and $4 per ton on amounts in excess of the quota. Should production fall short of the quota, payment will be made out of the common fund at the rate of $2 per ton in respect of the deficiency. There is no joint selling arrangement nor any provision for direct price regulation.

Other Iron and Steel Cartels.—International cartels were in existence before the war with regard to galvanised steel, tubes, pipes, rods, wire nails, enamel ware, etc. The parties in most cases included Germany, France, Belgium and Austria. Full information is not available as to the extent to which these have been revived. It appears, however, that an agreement has been reached between German, Czechoslovakian, French, Belgian, Luxemburg and Polish manufacturers for allocating markets and in some cases fixing prices in respect of tubes. An enamel ware cartel has also been re-formed ; a cartel in the form of a price convention of the principal European countries producing wood screws has been set up ; and an arrangement has been concluded between Belgian and German producers of rolled wire to refrain from competing in each other's home market

* Austria, Czechoslovakia and Hungary have since arranged to participate in the agreement.

Copper.—An important development is the formation of a copper syndicate comprising producers responsible, it is said, for some 90 per cent. of the world output. The syndicate will aim not only at fixing prices, but at reducing the number of middlemen in the trade. The functioning of the syndicate was dependent upon the sanctioning of American co-operation through an export association formed under the Webb-Pomerene Act of 1919. The Federal Trade Commission gave the necessary sanction in October, 1926, and the Association which is to be known as Copper Exporters Inc. was brought into existence.

Potash.—The cession of Alsace to France meant that the potash industry was not carried on wholly in Germany as had been previously the case. In 1925 an agreement was reached between the French selling company and the German Cartel for the exploitation of the North American market. More recently a general agreement has been concluded for a period of at least seven years.

Glass Bottles.—In connection with the exploitation of the European patent rights in the Owens glass bottle making machine, an arrangement was made in 1907 between the British manufacturers who were shareholders in the Europaischer Verband der Flaschenfabriken (the purchaser of the European patent rights), and the Continental shareholders, whereby the Continental companies undertook not to sell in this country at prices under those fixed by the British price-fixing association—the Association of Glass Bottle Manufacturers of Great Britain and Ireland. British manufacturers similarly agreed not to undersell Continental companies in their own countries. A further arrangement was arrived at before the war with the Europaischer Verband der Flaschenfabriken, in view of the depressed state of the industry, under which the output of the Owens machines was to be strictly limited at first and gradually increased.

Electric Lamps.—A feature in this case is the existence of arrangements for the exchange of patents and of experience. Agreements with regard to this have been in existence for some time between the Osram Company (the principal German manufacturing company), Philips (the principal Dutch company), and some other considerable lamp factories. Early in 1925 a Convention is said to have been signed by the leading lamp manufacturers throughout the world with regard to exchange of information about manufacturing methods and acquisition of patents, and a company—the Phoebus Company—was formed at Geneva to act as the administrative department of all the interests concerned. No arrangement is said to have been made in this Convention for fixing prices or other methods of business. Some years before, an arrangement was made between British and American manufacturers whereby the British market was made free from American competition, while the British firms undertook not to export to the United States, Mexico or Japan. An agreement for delimiting markets and fixing prices is said to have been made in 1926 between British, Dutch and German

interests. The conclusion of such international arrangements is undoubtedly facilitated by the close financial inter-relation of the principal undertakings. Thus the General Electric Company of America control the British Thomson Houston Company, the largest of three dominant firms in the British industry. They are also closely connected with the Dutch firm of Philips, who in turn are connected with the Osram Company and with the Swiss factories.

Explosives.—An international arrangement for the exchange of patents and experience somewhat similar to that which exists in the electric lamp industry exists in the explosives industry, where Nobel Industries, Limited are associated with two German companies—The Dynamit A.G. and the Köln Rottweil A.G.—and with the American Dupont Powder Company. Here, too, the companies have a financial connection. International agreements directed to limiting competition and dividing up markets have existed for many years, an International Powder agreement between British, German and American interests having been entered into so long ago as 1897.

Gas Mantles.—In 1926 the British gas mantle manufacturers entered into an agreement with the German manufacturers and certain associated manufacturers in other countries. The German manufacturers and the firms with them undertook not to sell gas mantles in the United Kingdom and certain other parts of the British Empire, whilst the British companies undertook not to sell to the Continent of Europe and the United States. Arrangements were made also in respect of other markets. The agreement was for five years.

International Trusts.

Petroleum.—The world trade is largely dominated by two enormous groups, the Standard Oil Group and the Royal Dutch Shell Group. As stated earlier, the dissolution of the Standard Oil Company in 1911 consequent on proceedings before the United States Supreme Court, did not result in restoring effective competition between the component companies into which the Trust was split up. The group retained its essential unity, and has in recent years greatly expanded by the absorption of other oil undertakings both in the United States and elsewhere. It controls approximately 28 to 30 per cent. of the world output.

The Royal Dutch Shell Group was formed in 1907 by association of the Royal Dutch Petroleum Company and the Shell Transport and Trading Company Limited. Its original centre of operations was the Dutch East Indies, but the activities of the group rapidly developed through the acquisition of oilfields in other countries, as well as of refineries and distributing organisation; and before the war its activities had become world-wide. Expansion has continued since the war, especially by the acquisition of oil interests in the United States and Mexico. The group controls about 10 per cent. of the world production.

While the Standard Oil and Royal Dutch Shell Groups together control less than half the world's production, their importance in international trade is far greater. Much the greater part of the petroleum supply of the world is produced in the United States by comparatively small concerns and is also consumed in the United States. The production of and trade in oil outside the United States is largely dominated by the two big groups. The principal independent company is the Anglo-Persian Oil Company

Tobacco. Following the attempt of the American Tobacco Company in 1902 to invade the British market and the repulse of that attempt by the newly formed Imperial Tobacco Company, Limited, the two companies entered into an alliance in the form of agreements for the division of business between themselves throughout the world. While the American market was reserved for the American company and the British market for the Imperial company, it was agreed to set up a new company—the British American Tobacco Company—to conduct the trade in other parts of the world. The importance which this company has acquired is to some extent indicated by its large paid-up capital (£20,571,000), the market valuation of which is in the neighbourhood of £100,000,000.

Matches. This industry is largely dominated by a trust headed by the Swedish Match Company. The company was formed in 1917 and controls practically the whole of the Swedish production, in addition to a sulphite pulp and paper mill, three match-making machinery works, three plants for manufacture of chemicals, three lithographic printing establishments, saw mills, transportation undertakings and timber lands. It has acquired sole or controlling interests in match factories in various parts of the world. It controls the International Match Corporation, an American Company (formed in 1923), owning 75 match manufacturing plants in various countries. Together with the parent company, the International Match Corporation controls over 150 match factories in 28 countries, employing over 50,000 workpeople. The Swedish Match Company has negotiated with foreign Governments to take over match industries as private monopolies. In 1925 it acquired jointly with the International Match Corporation 20-year monopolies in Poland and Peru; and in 1926 it secured monopoly rights in Greece, in return for a loan. As stated earlier an agreement has been reached for co-operation with independent German makers in prosecuting the German market. An arrangement has also been made with the Portuguese Government for prosecuting the Portuguese market.

THE CO-OPERATIVE MOVEMENT IN GREAT BRITAIN.

[*Furnished by the Ministry of Labour.*]

The co-operative movement has developed variously in different countries. In Germany, for example, the most characteristic, though not the only, development of co-operation has been the

farmers' co-operative bank; in Denmark and in Ireland it has been the farmers' co-operative production society; while in Great Britain, though almost all forms of co-operation have their examples, the main development has been the consumers' co-operative society. Upon the basis of the co-operative retail distributive society has been built up in Great Britain, not only a great inter-connected series of retail shops ("stores"), supplying a great variety of goods, but also a great productive and wholesale distributive organisation, embracing large "wholesale" societies with productive and distributive departments, to supply these shops.

The fundamental principle of this form of co-operation—which looks primarily to the interests of the consumer—is the distribution of the surplus, representing the difference between receipts and costs, (after paying a fixed rate of interest upon capital), not among the shareholders in proportion to their capital, nor among the workers in proportion to their wages, but among the customers in proportion to their purchases. By this means the members obtain their goods in principle at the wholesale price plus the bare cost of handling and selling.

The activities of the consumers' co-operative societies are not wholly restricted to co-operative trading and manufacture. There is, for example, a co-operative bank, carried on as a department of the Co-operative Wholesale Society. There is also a Co-operative Insurance Society, carried on as a joint department of the English and of the Scottish Co-operative Wholesale Societies. One branch of this insurance society's business, that of collective life insurance, under which retail societies may insure all their members, both the premiums and the claims being calculated, without any reference to the insured persons' state of health, on the amount of their *purchases*, is especially noteworthy as illustrating the cardinal principle of consumers' co-operation, that of dividend on purchases.

By far the greater part of the total production of co-operative societies in Great Britain is carried on by consumers' societies (including the wholesale societies); but there are also a number of productive societies formed and carried on primarily in the interests of the workers employed by them. The diverse ideals represented by these two distinct types of society have been present throughout the history of the movement. Thus, the primary object in the programme of the Rochdale Equitable Pioneers' Society, who opened their famous store in 1844, was the establishment of a store for the sale of provisions, clothing, etc., and the rules of the Society provided for the division of the profits among the members in proportion to their purchases. The numerous other "store" societies subsequently established followed in the main the Rochdale plan. Meanwhile, however, associations of workers were being formed for co-operative production primarily in the interests of persons employed, the rules of the societies providing for the distribution of the profits among the workers, who constituted the membership and managed the affairs of the workshops.

In both cases the full programmes of these early co-operators embraced wider aims. That of the Rochdale Pioneers, for example, included provision for the manufacture of goods in order to provide work for members out of employment; it contained proposals for the building or purchasing of houses for members, for the purchase or rent of land to be cultivated by members out of employment or badly remunerated, and for the opening of a temperance hotel to promote sobriety; it further provided that the society should proceed "to arrange the powers of production, distribution, education and government, or in other words to establish a self-supporting colony of united interests." Similarly, the Society for Promoting Working Men's Associations which was established, a few years later, under the auspices of the Christian Socialist movement to advocate the formation of self-governing co-operative workshops, included in its programme proposals to work with other associations for a complete organisation of distribution, exchange, and interchange, and to establish, conjointly with other associations, such institutions as might be beneficial to all of them (such as general stores, benefit clubs, schools, libraries, etc.).

In practice, neither of the two branches of the movement has accomplished its full aims as expounded in these early programmes; and each has devoted most of its energies to realising that part of its programme which stood first. The stores, dividing their profits wholly or mainly among their customers in proportion to purchases, have established themselves and have also developed a large productive organisation. But the productive associations of workers, holding out the ideal of dividing their profits among the associates, organised in self-governing workshops, have had much less success. They have tended to come more and more under the control of the "store" societies, which frequently provide a considerable part of the capital, share in the management and profits and buy nearly the whole of the goods produced; and while there are still a number of associations in which the employees share in the profits and in the management of the business, these associations now account for only a small part of the total production of co-operative societies in Great Britain.

Statistics dealing with the development of the co-operative movement in Great Britain are published annually in the "Ministry of Labour Gazette," based on the statutory returns rendered to the Chief Registrar of Friendly Societies by the Societies under the provisions of the Industrial and Provident Societies Acts. It is not essential that societies should be really co-operative in character to obtain registration under those Acts and a few societies are registered which are not of this character, but these are excluded from the statistics published in the "Ministry of Labour Gazette," which relate to organisations of the type of the workmen's co-operative society, or, in the case of agriculture, of the small farmers'

society. The distinguishing features of this type of co-operative society, as specified in a Report on Co-operative Societies (Cd. 6045), issued by the Labour Department of the Board of Trade in 1912, are as follows, though not all of these features are necessarily found in every society :—

1. Membership is open to all comers, the committee of the society, however, usually having the right to refuse the admission of any persons whose membership is regarded as likely to be detrimental to the interest of the society. Subject only to this qualification, the shareholders' list of a co-operative society is never closed.

2. The shares in a co-operative society (which are invariably issued at par value) are in all cases of small amount (usually £1), and may generally be paid-up by weekly or quarterly instalments, or by the automatic accumulation of the sums accruing to the holder as his share in the profits of the society, without the necessity for any cash payment beyond a trifling amount paid on allotment.

3. The bulk of the share capital is withdrawable at short notice. Many of the societies, however, compel each member to hold at least one transferable share, which can be realised only by sale.

4. Almost without exception, each individual member possesses one vote, irrespective of the number of shares held. Where share capital is owned by other societies, these societies are usually allowed additional votes in some proportion to the amount of share capital held by them.

5. Proxy voting is almost unknown.

6. The return on share capital is in most cases limited to a fixed rate of interest (usually 5 per cent. per annum). In many societies the full rate of interest is not paid if the member's purchases fall below a stated amount in a given period. The surplus profits remaining after the payment of this interest are usually distributed in certain agreed proportions, in some cases between the society's customers, both members and non-members, as dividend on purchases, in others between the shareholders, the customers, and the employees ; while, in the case of agricultural societies, they are divided between the customers, the employees, the suppliers of raw materials, and the shareholders ; but seldom do the shareholders receive, in right of their capital, the whole of the profits.

7. Publicity of accounts is a universal feature. As a rule, the statements of accounts issued by the Societies are detailed and complete.

8. The trading of societies is not confined to members, although in practice the amount of sales to non-members is small, owing to the fact that admission to membership is easy, and that membership usually entitles the customer to double the rate of dividend on purchases that he would receive as a non-member.

9. The societies are, with few exceptions, formed under laws* specially passed to meet the requirements of the industrial classes and not, under the Companies Acts, as ordinary joint-stock undertakings.

A definition of the term "co-operative," prepared by the co-operative movement itself, was contained in the Industrial and Provident Societies (Amendment) Bill, 1924, promoted by the Co-operative Union—a national association of co-operative societies whose objects include propaganda in favour of co-operative principles and ideals, the promotion of education, and "other objects and purposes of a similar character, with a view to the ultimate establishment of a Co-operative Commonwealth." The first clause of this Bill read as follows :—

"1. A society shall be entitled to use the word "co-operative" as part of its name if provision is made in its rules :—

(*a*) That no member or shareholder other than a society shall have more than one vote.

(*b*) That the surplus funds arising from the business of the society, after making proper provision for depreciation and working and preliminary expenses applied as provided by the rules which shall be approved by the Registrar, shall be distributed as follows :—

(i) In payment of interest on the paid-up capital at a rate not exceeding six per cent. per annum.

(ii) In the formation of a reserve fund applicable in the manner provided by the rules.

(iii) In promoting instruction, culture, or recreation by forming an education fund to which two and a half per cent. of the net surplus funds, or such other sum or percentage as an ordinary business meeting may resolve, shall be carried.

(iv) In the division of the remainder of the net surplus funds, after providing for the before-mentioned charges and for such other payments as may be authorised by the rules, either among the members or shareholders in proportion to the volume of business which they have done with or through the society, or among the employees of the society, or partly in one way and partly in another."

* Friendly Societies Acts, 1896–1908, and the Industrial and Provident Societies Acts, 1893–1913, under which no one can hold more than £200 of shares.

The principal statistics, showing the progress of the movement in recent years, and the position in 1924 (the latest year for which figures are at present available) are summarised below, separate figures being given for (*a*) industrial societies (including consumers' societies and workers' associations); (*b*) agricultural and fishery societies; and (*c*) housing societies. Of these, the "industrial" societies constitute by far the most important group from the point of view of aggregate membership, capital employed, and volume of production and sales.

Industrial Societies.

The statistics published by the Ministry of Labour* dealing with the operations of industrial societies of the workmen's co-operative type show that over fifteen hundred such societies were at work in 1924, with an aggregate membership of 4,690,000, and share, loan and reserve capital amounting to £145,600,000. The total sales of these societies (including the sales by the wholesale and the productive societies to the retail distributive societies, as well as the sales by the retail societies) amounted to £271,000,000. The net surplus shown, before deduction of interest on share capital, was £21,267,000. The retail societies' sales amounted to over £174,000,000.

While some societies are engaged only in production and others wholly in retail distribution, the great majority undertake some form of production as well as distribution.

Production.

The total number of societies engaged in some branch of production in 1924 was 1,147. These societies employed in their productive departments over 80,000 persons, whose salaries and wages in 1924 amounted to nearly £10,350,000, and the value of the productions, as shown by the gross aggregate of the returns received, was nearly £67,700,000.†

* See "Ministry of Labour Gazette," October, 1925.

† This total includes the value of materials and of partly manufactured goods purchased and used for further production by each society making returns. It should not, therefore, be assumed to represent the *net* value by which the value of materials, etc., purchased was increased as a result of the productive activities of co-operative societies: the *net* value would, of course, be represented by a much smaller figure.

The following table gives corresponding figures as to the value of production in earlier years, and analyses the totals by groups of societies. The figures, it might be mentioned, include the value of the farm and dairy products of the industrial societies.

*Wholesale Value of Productions.**

Year.	Consumers' Societies.			Associations of Workers.	Totals.
	Productive Departments of Distributive Societies.		Productive Societies.		
	Wholesale Societies.	Retail Societies.			
	£	£	£	£	£
1899	3,558,000	3,906,000	1,637,000	1,095,000	10,196,000
1904	5,818,000	6,057,000	2,020,000	1,109,000	15,004,000
1909	9,313,000	12,183,000	2,018,000	1,247,000	24,761,000
1914	12,790,000	15,705,000	2,327,000	1,779,000	32,601,000
1919	36,321,000	28,465,000	3,027,000	4,497,000	72,310,000
1920	48,073,000	38,377,000	3,538,000	5,404,000	95,392,000
1921	37,925,000	38,124,000	3,218,000	3,435,000	82,702,000
1922	27,620,000	29,981,000	2,537,000	2,671,000	62,809,000
1923	28,264,000	27,983,000	2,450,000	2,844,000	61,541,000
1924	32,242,000	29,661,000	2,788,000	2,980,000	67,671,000

Note.—Up to and including the year 1920, the figures given include industrial co-operative societies in Ireland which are not included in those for subsequent years. The effect of this difference in the statistics, however, is very small; for example, in 1919, the Irish societies accounted for only £91,000 of the grand total of over £72,000,000 shown for all societies.

For each group of societies the figures show a rapid increase in the value of productions in the 15 years prior to the war, especially marked in the productive departments of the consumers' distributive societies, both wholesale and retail. Comparison of the figures for 1914 and 1924 is rendered difficult by the change in price-levels between the two dates. When due allowance is made for this factor a considerable further increase in production is shown by the wholesale distributive societies, and some increase by the retail distributive societies; but the total production of the group of consumers' societies existing primarily for production appears to have been on a lower scale in 1924 than in 1914, and that of the associations of productive workers shows little, if any, expansion.

* See footnote on page 119.

The following table shows by groups of industries for the year 1924 the numbers of persons employed *in production*, the amount of salaries or wages paid, and the gross value* of production :—

Industry Group.	Associations of Consumers.			Associations of Workers.		
	Employees.	Salaries and Wages.	Value of Productions.	Employees.	Salaries and Wages.	Value of Productions.
		£	£		£	£
Food and Tobacco.	25,770	3,714,000	47,809,000	120	12,700	86,000
Clothing ..	20,200	2,185,000	5,723,000	4,820	487,500	1,735,000
Textiles ..	3,400	334,000	1,703,000	710	86,000	514,000
Soap, Candles, Starch, etc.	1,810	248,000	2,551,000	—	—	—
Building, Decorating, Woodworking, etc.	9,200	1,487,000	3,252,000	460	55,600	130,000
Paper, Printing, etc.	2,860	379,000	1,166,000	1,010	152,600	318,000
Other Industries and Services.	8,910	1,102,000	2,487,000	880	102,300	197,000
Totals ..	72,150	9,449,000	64,691,000	8,000	896,700	2,980,000

The manufacture and preparation of foodstuffs accounts for over two-thirds of the gross value of productions in 1924, as shown by this table. The productive departments of the retail societies are principally occupied in food preparation (mainly bread and confectionery making, grain milling, and the slaughtering of animals for meat) ; boot and shoe making and repairing ; tailoring ; dressmaking and millinery ; building, decorating, etc. Those of the wholesale societies include grain milling ; the manufacture of preserves, jams, biscuits, confectionery, margarine and lard ; the preparation of cocoa, coffee, and tobacco ; tea blending ; the manufacture of textiles, clothing, boots and shoes, soap, various metal wares, mats and paints ; building and decorating ; woodworking and furniture manufacture ; printing ; in addition to many other forms of productive activity. The consumers' productive societies are engaged principally in baking, milling, and laundering ; and workers' associations for production chiefly in boot and shoe manufacture, tailoring, manufacture of textiles, printing, and woodworking.

* See footnote on page 119.

Distribution.

At the end of 1924, three* wholesale societies and 1,368 retail societies in Great Britain were engaged in distribution. These societies had in that year an aggregate membership of 4,645,000, a total capital (including shares, loans, and reserves) of £141,600,000; and sales (including sales by the wholesale to the retail societies) amounting to £264,674,000. Their surplus in 1924, before deducting interest on share capital, was £20,864,000. The total number of persons employed by these societies in their distributive departments was 112,400, the salaries and wages of whom amounted to approximately £15,000,000 during the year.

In the following table the sales of the wholesale distributive societies and the membership and sales of the retail distributive societies in Great Britain are shown separately for a series of years :—

Year.	Wholesale Societies' Sales.	Retail Societies.	
		Membership.	Sales.
	£		£
1884	5,976,000	696,000	19,546,000
1889	9,303,000	931,000	25,852,000
1894	12,501,000	1,211,000	32,197,000
1899	19,227,000	1,610,000	44,985,000
1904	26,610,000	2,073,000	59,162,000
1909	33,133,000	2,460,000	70,142,000
1914	44,336,000	3,031,000	87,362,000
1919	114,123,000	4,095,000	197,305,000
1920	134,999,000	4,420,000†	243,000,000†
1921	102,926,000	4,511,000	218,322,000
1922	82,914,000	4,451,000	168,799,000
1923	83,467,000	4,511,000	164,123,000
1924	90,200,000	4,642,000	174,473,000

Between 1884 and 1914 the sales of the wholesale distributive societies rose from less than £6,000,000 per annum to over £44,000,000 and those of the retail distributive societies from £19,500,000 to over £87,000,000, whilst the membership of the retail societies rose from less than 700,000 to over 3,000,000. The sales in 1924 show a further marked increase, even when allowance is made for the difference in the price-levels of 1914 and 1924, and the membership also has continued to expand. If it is borne in mind that in many cases only one person in a family is a member of the co-operative society, it will be realised that the proportion of the population drawing part of their supplies from co-operative stores is considerably greater than would be apparent from a comparison of the total membership of retail societies (nearly 4,650,000 in 1924) with the total of the working-class population.

* Including the Joint Tea, etc., Department of the English and Scottish Wholesale Societies, which was registered as a separate society in 1924.

† Approximate figures.

The annual retail sales per head of membership which remained fairly constant at about £27 to £29 per head in the thirty years preceding the war, and were about £28 16*s.* in 1914, averaged about £36 8*s.* in 1923 and £37 12*s.* in 1924. Thus, if allowance is made for the change in price-levels, there would appear to have been a reduction in the average quantity of goods purchased per head of membership in 1924 as compared with 1914.

Dividends.

Among the consumers' societies the surplus resulting from the societies' operations, after payment of all expenses and of a fixed rate of interest (generally 5 per cent.) on share capital and after provision for reserves, educational and charitable purposes, etc., is distributed to customers as a dividend of so much in the £ on the amount of their purchases during the period to which the surplus relates. The rate of dividend varies in different societies: the average dividend distributed by the retail societies in 1924 was 1*s.* 6¾*d.* in the £ on purchases, as compared with 1*s.* 4¾*d.* in 1923, and 1*s.* 3½*d.* in 1922. Before the war the dividends were higher, the average having been 2*s.* 5¾*d.* in each of the years 1912 to 1914, and 2*s.* 7¾*d* in the years 1900–1902. The tendency towards reduction in dividends has been partly the result of constant advocacy of reduction in prices.

Profit-sharing with Employees.

Although some co-operative societies still have schemes for the sharing of profits (or "surpluses") with their employees, the number is constantly declining and is now only a small proportion of the total number of societies. Special enquiries made by the Ministry of Labour showed only 78 industrial societies with such schemes in operation in 1925, the number of employees entitled to participate in the profits or surpluses being about 22,000, and the average amount of bonus paid being approximately £5 per head in 1925, equivalent to an addition of about 4 per cent. on earnings. Of these 78 societies, 52, with 15,000 employees, were retail distributive societies and 26, with 7,000 employees, were societies engaged mainly in production. In former times the English and the Scottish Wholesale Societies had schemes of profit-sharing with employees in operation, but in both cases these schemes have been abandoned

The English Society tried two schemes, the first in 1873–76, and the second in 1882–86, and then finally discontinued the arrangements. On the other hand, the Scottish Society, which introduced a system of profit-sharing with employees in 1870, continued to operate the system—with some changes in conditions from time to time—until 1915, when the scheme was terminated.

Agricultural and Fishery Co-operative Societies.

Co-operation as applied to agriculture in Great Britain aims principally at providing an organisation for increasing the efficiency and improving the position of the farmer, small holder, or allotment holder by (1) enabling him to purchase his requirements, seeds, fertilisers, utensils, etc., more cheaply, or (2) assisting him in selling his produce, or (3) supplying him with some service required in carrying on his work, e.g., threshing. In addition to the societies formed for these purposes there are a number of societies with special objects, including small holdings and allotment societies, credit societies, cattle insurance societies, and societies for the promotion of agriculture and horticulture.

Requirement Societies.—In 1924 there were 506 co-operative societies in Great Britain, formed primarily to supply farmers' and allotment workers' requirements of seeds, manures, utensils, etc.; there were also 48 societies performing analogous services for fishermen.* The aggregate membership of these societies in 1924 was 98,600, and their sales amounted to over £8,850,000, resulting in a profit of £59,400. The total share, loan and reserve capital was over £2,140,000, and the amount paid in wages in 1924 was £340,000. The figures for 1924 show a considerable increase over those for pre-war years: in 1914, for example, the number of such societies was 274, the aggregate membership was 29,600, the sales amounted to £1,816,155, and the aggregate profit for the year was £26,839. Of the total sales of over £8,850,000 in 1924, farmers' societies accounted for over £8,190,000, allotment workers' societies for £169,000, and fishermen's societies for £102,000.

Produce Societies.—The number of agricultural co-operative societies in Great Britain chiefly concerned with the marketing of members' produce in 1924 was 238, including 98 dairy societies, 66 egg and poultry societies, 47 farmers' and growers' societies, 12 fruit and market garden produce societies and 15 miscellaneous societies. The total membership was 34,900, the aggregate share, loan and reserve capital was £1,100,000, and the sales in the year amounted to £3,670,000. The amount paid in wages was £167,000. For all the societies combined, a net loss of £6,000 was shown in the year. In 1914, the number of societies was 129, with a total membership of 10,400 and sales amounting to £935,000.

It should be observed that, in addition to these agricultural societies, 196 of the industrial societies referred to in the previous section of this Memorandum had farming and dairying departments, the total productions of which amounted, in 1924, to £1,590,000, the amount paid in wages being £290,000.

Agricultural Service Societies, Small Holdings and Allotments Societies, Credit Societies, Cattle Insurance Societies, etc.—This miscellaneous group included, in 1924, 949 societies, with a total

* See "Ministry of Labour Gazette," November, 1925.

membership of 177,000, as compared with 346 societies and 30,000 members in 1914. Of these, small holdings and allotment societies numbered 734, with 152,000 members, in 1924.

Co-operative Housing Societies.

The statistics compiled by the Chief Registrar of Friendly Societies* show that in 1924 there were 238 co-operative housing societies in Great Britain registered under the Industrial and Provident Societies Acts, with 14,700 members (of whom nearly 5,000 were tenants), share capital of £713,000, loan capital of £7,066,000 and reserves of £194,000. The aggregate amount received in rents in 1924 was £477,500, and a net profit of £65,000 was earned during the year. The aggregate cost value of the land and buildings at the end of 1924 was returned at £7,697,000.

These societies are distinct from the building societies established under the Building Societies Acts, which help their members to buy houses, but do not erect them.

JOINT STOCK COMPANIES.

Number and Capital of Companies.

NUMBER AND PAID-UP CAPITAL OF ALL COMPANIES IN GREAT BRITAIN HAVING A SHARE CAPITAL WHICH WERE ON THE REGISTER AT VARIOUS DATES.

Note.—The figures exclude such companies as were in course of liquidation, or removal from the Register under the provisions of Section 242 of the Companies (Consolidation) Act, 1908, and corresponding provisions of earlier Acts.

Date.	No. of companies.			Total paid-up capital.	Average paid-up capital.
	Public.	Private.	Total.		
				£ millions.	£
30 April, 1885	Not distinguished.		8,924	481·9	54,002
30 April, 1895			18,607	1,037·2	55,745
30 April, 1905			38,317	1,911·9	49,897
30 April, 1910	25,930†	24,207†	50,137	2,132·6	42,536
30 April, 1912	21,104†	33,455†	54,559	2,287·9	41,936
30 April, 1914	14,270†	48,492†	62,762	2,481·8	39,544
31 Dec., 1921	12,923	67,071	79,994	4,100·0	51,254
31 Dec., 1923	10,449	77,481	87,930	4,265·3	48,508
31 Dec., 1924	9,109	81,809	90,918	4,355·8	47,909
31 Dec., 1925	8,990	86,065	95,055	4,470·3	47,029

* See "Ministry of Labour Gazette," December, 1925.

† The total numbers of companies on the 30th April, 1910, 30th April, 1912, and 30th April, 1914, are correctly stated, but the division between public and private companies has been obtained by taking the number of private companies on 31st December, 1909, 31st December, 1911, and 31st December, 1913, respectively, which are the only figures available.

The above table has been compiled from the annual reports on companies issued by the Board of Trade. Information as to the meaning of the terms "public" and "private" in relation to companies will be found in the memorandum on page 130. The distinction between the two categories was first made by the Companies Act of 1907 and came into operation on the 1st July, 1908. On the 31st December, 1908, the number of private companies on the register in Great Britain was 18,554. The numbers in 1910 and certain later years are given in the table, and it will be seen that the number has steadily increased throughout. Simultaneously the number of public companies has declined, but this decline does not necessarily indicate a contraction of the area of joint stock enterprise available for the investing public. In the first place, the annual reports of the Board of Trade do not distinguish between the total paid-up capital of public and of private companies respectively, and it is therefore impossible to say whether the aggregate capital of public companies has actually declined or has increased. In any case, it may be regarded as certain that the aggregate capital of public companies represents a much larger proportion of the total capital of all companies than the proportion of their number to the total number of companies. In the second place, in addition to the companies registered as "private," there were originally a large number of companies which were in the popular sense private in that they did not issue invitations for public subscriptions, but were not so in the legal sense since their Articles of Association did not comply with the statutory requirements laid down for private companies. There was a strong tendency for such companies to transfer themselves from the category of public to private companies by effecting the necessary change of constitution, and out of the total of 48,492 private companies on the register in 1914, over 15,000 were the result of conversions of this kind. In so far however, as the companies affected did not previously issue invitations for public subscriptions, the process clearly did not result in any contraction in the field actually open to public investment.

The following table (also compiled from the Annual Reports of the Board of Trade) is added to show the annual numbers of companies of different sizes (as measured by nominal capital) which were formed in the various periods specified. The table shows how greatly the number of very large companies registered in 1919 and 1920 exceeded both the pre-war averages, and the average of the subsequent five years (1921–5).

CLASSIFICATION OF COMPANIES REGISTERED IN GREAT BRITAIN in certain years according to the amount of their nominal capital.

Nominal capital.	Average for 5 years 1899–1903.	Average for 5 years 1909–1913.	Year 1919.	Year 1920.	Average for 5 years 1921–1925.
Under £1,000	272	841	478	606	1,433
£1,000 and under £5,000	1,034	2,649	2,972	2,835	3,346
£5,000 ,, ,, £10,000	640	1,066	1,999	1,958	1,262
£10,000 ,, ,, £20,000	706	859	2,092	1,919	958
£20,000 ,, ,, £50,000	648	625	1,377	1,537	602
£50,000 ,, ,, £100,000	311	310	603	617	217
£100,000 ,, ,, £200,000	275	210	411	527	129
£200,000 ,, ,, £300,000	95	76	199	264	44
£300,000 ,, ,, £400,000	43	30	50	95	17
£400,000 ,, ,, £500,000	14	13	24	43	9
£500,000 ,, ,, £750,000	28	31	69	117	17
£750,000 ,, ,, £1,000,000	7	6	14	26	4
£1,000,000 and above ..	19	21	87	98	13
Total	4,092	6,737	10,375	10,642	8,051

Number of Shareholders and Average Amount of Shareholding in Certain Companies.

The following figures, in regard to the five large joint stock banks, were published by the Rt. Hon. Walter Runciman, M.P., in October, 1924 :—

	Paid-up capital, etc.	Number of holders.	Average amount of holding (nominal value.)
	£		
Midland Bank	11,976,890	57,250	209
Lloyds Bank	14,372,956	55,668	258
Nat. Prov. Bank	9,479,416	41,603	227
Westminster Bank	9,051,718	69,882	130
Barclays Bank	15,592,372	51,011	306
Total	60,473,352	275,414	219

The following figures in regard to 18 well-known companies, representing various industries and trades, were published in December, 1926, by "The Economist." They were obtained by a method of sampling, approximately every hundredth shareholding in the companies in Group I (large-sized concerns) being taken and approximately every fortieth shareholding in Group II. (concerns of moderate size).

Group I.

	Paid-up Capital.	Number of Shareholders (To nearest 100).	Average amount of holding (nominal value).
	£		£
Imperial Tobacco	42,809,633	106,900	401
Courtauld's	20,000,000	47,900	417
Anglo-Persian Oil	19,450,000	57,500	338
Brunner-Mond	13,749,303	37,200	370
Vickers	12,468,968	70,400	182
Dunlop Rubber*	6,723,042	51,600	130
Cunard Steamship*	4,456,189	14,000	318
	£119,657,135	385,500	310

Group II.

General Electric Co.	5,741,975	23,100	249
Spillers' Milling	3,803,674	10,700	356
Phœnix Assurance*	3,792,795	8,500	446
Ebbw Vale Steel	3,700,000	12,200	303
Bass, Ratcliff and Gretton ..	3,400,000	3,900	870
Marconi's Wireless Telegraphy*	3,249,913	24,600	132
English Sewing Cotton ..	3,000,000	16,000	188
Debenture Corporation ..	2,000,000	4,800	417
Cairn Line*	1,200,000	2,900	414
Rover Company*	1,050,000	8,300	127
Savoy Hotel	988,934	3,400	291
	£31,927,291	118,400	270

Taking all the companies in both groups together, the mean figures are :—

Average holding of preference capital	£340
,, ordinary capital	£283
,, ,, ,, all capital	£301

* Ordinary Shares only.

Distribution of Shareholding.

Sir R. L. Wedgwood, C.B., C.M.G., Chief General Manager of the London and North Eastern Railway, who gave evidence to the Committee on Industry and Trade on behalf of the Railway Companies' Association, furnished the following table, dated January, 1926, showing the approximate number of holdings of loans and debenture stock and share capital and stock in the four amalgamated railway companies.

Company.	Number of holdings.			
	£500 and under.	Over £500 and not over £1,000.	Over £1,000.	Total.
Great Western Railway ..	80,230	26,640	28,338	135,208
London and North Eastern..	122,811	50,693	79,457	252,961
London Midland and Scottish	235,069	71,073	80,228	386,370
Southern Railway ..	62,290	24,993	33,050	120,333
Total	500,400 =56%	173,399 =19%	221,073 =25%	894,872 =100%

The following figures, obtained as described on page 128, were published by "The Economist" in December, 1926 :—

Group I.

Company.	Proportion of holdings of—		
	£500 and under.	Over £500 and not over £1,000.	Over £1,000.
	%	%	%
Imperial Tobacco	85·1	8·3	6·6
Courtauld's	90·7	4·8	4·5
Anglo-Persian Oil.. .. .	87·4	8·0	4·6
Brunner, Mond	84·2	10·2	5·6
Vickers	85·5	8·1	6·4
Dunlop Rubber*	80·8	9·9	9·3
Cunard Steamship*	72·4	12·1	15·5
Total—Group I	85·2	8·3	6·5

*Ordinary shares only.

Group II.

Company.	Proportion of holdings of—		
	£500 and under.	Over £500 and not over £1,000	Over £1,000.
	%	%	%
General Electric Co.	90·3	6·6	3·1
Spillers' Milling	85·7	8·2	6·1
Phoenix Assurance*	86·0	7·6	6·4
Ebbw Vale Steel	88·4	6·7	4·9
Bass, Ratcliff and Gretton ..	77·4	12·9	9·7
Marconi's Wireless Telegraphy* ..	91·0	6·3	2·7
English Sewing Cotton	92·6	5·8	1·6
Debenture Corporation	65·6	17·7	16·7
Cairn Line*	85·0	3·4	11·6
Rover Company*	85·6	5·5	8·9
Savoy Hotel	82·9	8·6	8·5
Total—Group II	87·8	7·2	5·0
Total—Groups I and II ..	85·7	8·1	6·2

*Ordinary shares only.

PUBLICITY OF COMPANIES' TRADING RESULTS.

Statutory Requirements.

Trading companies registered under the Companies Acts 1908–1917 are divided into two classes (1) public companies, (2) private companies. It will be seen from the table on p. 125 that the total number of companies on the Register in Great Britain on the 31st December, 1925, was about 95,000, of which 86,000 were private companies, so that private companies number about 90 per cent. of the total number.

Public companies are not defined by the Acts, but include all companies having a share capital, other than private companies. Under Section 26 (3) of the Act of 1908, every company having a share capital, other than private companies, must include in the Annual Return which has to be filed with the Registrar of Companies "a statement, made up to such date as may be specified in the Statement, in the form of a Balance Sheet, audited by the company's auditors, and containing a summary of its share capital, its liabilities,

and its assets, giving such particulars as will disclose the general nature of those liabilities and assets and how the value of the fixed assets have been arrived at, but the Balance Sheet need not include a statement of profit and loss." A common practice of companies in filing the " Statement in the form of a Balance Sheet " is to have a special statement prepared which will comply strictly with the provisions of the Act; but in many cases the printed Balance Sheet which is issued to shareholders, and which gives fuller information than that required by the Act, is filed. Any member of the public can inspect filed documents and can obtain copies of such documents on payment of the prescribed fees.

Apart from this provision, there is nothing in the Companies Acts which makes it obligatory on a public company to disclose to the public any particulars with regard to its trading.* Section 113 (3) provides that any shareholder of a company shall be entitled to be furnished with a copy of the Balance Sheet and Auditor's report at a charge not exceeding 6*d.* for every hundred words, but under Section 114 this right does not extend to preference shareholders and debenture holders in public companies registered prior to the 1st July, 1908.

A *private company* is defined in Section 121 of the Act of 1908 as one which by its Articles :—

I. Restricts the right to transfer shares.

II. Limits the number of its members, exclusive of persons in the employment of the company, to 50, and

III. Prohibits any invitation to the public to subscribe for any shares or debentures of the company.

The Statute does not require any publicity to be given by private companies† as to their trading results. Section 114, which gives preference shareholders and debenture holders of public companies (other than those registered prior to the 1st July, 1908) the same right to receive and inspect the balance sheets of the company and the reports of the auditors and other reports as is possessed by the holders of ordinary shares in the company, does not apply to private companies, so that only the ordinary shareholders of private companies have the right under Section 113 to be furnished with a copy of the balance sheet and auditor's report at the prescribed charge.

* Reports of annual general meetings of most companies of any substantial importance appear in the financial papers and the leading newspapers, and the Chairman of the meeting usually refers to certain figures in the Balance Sheet and quotes the amount of profit or loss as the case may be.

† No reports of the annual general meetings of private companies appear, as a rule, in the public press.

Both public and private companies have to register, with the Registrar of Companies, Articles of Association prescribing regulations for the company ; and a model form of Articles (which may be adopted or not, as the particular company may choose) is contained in Table A of the First Schedule to the Companies (Consolidation) Act, 1908.

The following are the provisions of Table A with regard to the Balance Sheet and Profit and Loss Account issued by the Company :—

106. Once at least in every year the directors shall lay before the company in general meeting a profit and loss account for the period since the preceding account or (in the case of the first account) since the incorporation of the company, made up to a date not more than six months before such meeting.

107. A balance sheet shall be made out in every year and laid before the company in general meeting made up to a date not more than six months before such meeting. The balance sheet shall be accompanied by a report of the directors as to the state of the company's affairs, and the amount which they recommend to be paid by way of dividend, and the amount, if any, which they propose to carry to a reserve fund.

108. A copy of the balance sheet and report shall, seven days previously to the meeting, be sent to the persons entitled to receive notices of general meetings in the manner in which notices are to be given hereunder.

It will be seen that under Table A the Directors have to lay before the Company in general meeting a profit and loss account and to send a copy of the balance sheet and directors' report to all the persons entitled to receive notices of general meetings, but the general meetings of companies are only open to the shareholders of those companies.

Although very few public companies adopt the provisions of Table A in regard to Articles, and most have special Articles of their own, it is usual for those Articles to contain some such provisions as are quoted above.

Suggested Modifications.

In January, 1925, the Board of Trade appointed a Committee, known as the Company Law Amendment Committee, to consider and report what amendments were desirable in the Companies Acts,

1908 to 1917. The Committee reported in May 1926, and the following extracts from the Recommendations on the subject of Accounts and Balance Sheets (Recommendation 72, I, V, VI and VII, Cmd. 2657/1926) are given as being relevant to the question of publicity of trading results.

Accounts.

I. Directors should be bound to see that proper accounts are kept and to lay a profit and loss account and balance sheet before the Company in general meeting once a year at least, and we recommend that Articles 103, 104, 106 and 107 of Table A* should be made compulsory in the case of all companies In addition to the accounts referred to in Article 103 there should be accounts of all goods sold and bought. . . . . A heavy penalty should be imposed for failure to comply.

Form of Balance Sheet.

V. (*a*) It should be provided that every balance sheet shall contain a summary of the company's share capital and shall give such particulars as will disclose the general nature of the liabilities and assets of the company and how the values of the fixed assets have been arrived at.

(*b*) Preliminary expenses and goodwill (where it is shown as a separate item in or is otherwise ascertainable from the books or papers of the company) should be separately stated in the balance sheet.

(*c*) If a liability is secured, the fact should be stated without, however, any obligation to specify the assets on which it is secured. . .

(*d*) Investments in, and loans to or from subsidiary companies (as defined below in sub-paragraph VII of this paragraph) should be stated in the balance sheet separately from all other assets, and the loans should be stated separately from the investments. It will be sufficient to state the aggregate of the loans and the aggregate of the investments without distinguishing loans to or investments in particular companies.

VI. Section 26 (3) should be amended so as to provide for the annual filing of a certified copy of the last audited balance sheet, together with the auditor's certificate, in lieu of the present statement.† . . . .

Accounts of Holding Companies.

VII. A section should be inserted in the Act to provide that where a company (hereinafter called the "holding company") holds shares in a subsidiary company a certificate signed by the same persons as sign the balance sheet should be appended to the balance sheet of the holding company and filed with it, stating how the aggregate profits and losses of any subsidiary company or companies during the period covered by the accounts presented have been dealt with in the accounts of the holding company.

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* The text of Articles 106 and 107 is given above. The text of Articles 103 and 104 is as follows :—

103. The directors shall cause true accounts to be kept of the sums of money received and expended by the company and the matter in respect of which such receipt and expenditure takes place, and of the assets and liabilities of the company.

104. The books of account shall be kept at the registered office of the company, or at such other place or places as the directors think fit, and shall always be open to the inspection of the directors.

† It will be seen from page 130 that Section 26 (3) does not apply to private companies. The Committee specifically stated in their report (par. 86) that they could not accept the suggestion which had been made that private companies should be compelled to file accounts, etc., in the same way as public companies.

The following definition of a subsidiary company for the purpose of this provision is suggested :—

> When a company includes among its assets and holds either directly or through a nominee or nominees shares in another company and (i) by means of such holding either (*a*) has more than fifty per cent. of the voting power in such other company, or (*b*) holds more than fifty per cent. of the issued share capital of such other company or (ii) has power to appoint or nominate the majority of the directors or persons occupying the position of directors, by whatsoever name called, of such other company then such other company shall be deemed to be a subsidiary company for the purpose of this section.

In order to meet cases where the subsidiary company as above defined is not actually controlled by the holding company, it should be provided that where the directors of the holding company certify in writing that the holding company is not lawfully entitled or is otherwise unable to obtain the information required for the purpose of the certificate mentioned above, such certificate of the directors should be appended to the balance sheet in lieu of the certificate mentioned above.

CHAPTER II.

TRAINING AND RECRUITMENT.

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APPRENTICESHIP.

[*Furnished by the Ministry of Labour.*]

Introductory.

The object of this memorandum is to give some account of the present state of apprenticeship in this country, based upon information acquired by the Ministry of Labour in the course of their normal administration. An inquiry into the general question of apprenticeship has been undertaken by the Ministry of Labour during the last year, but the results of that enquiry have not yet been fully studied and tabulated.

The importance of the subject will be obvious. One of the most valuable assets of a country which depends for its existence on the export of manufactured articles is the skill of its workers. The system of apprenticeship is still the most usual method of imparting skill. The problems of apprenticeship, therefore, have a direct bearing on the prosperity of the country.

Description of Apprenticeship.—In this memorandum the term "Apprenticeship" is used as meaning a contractual relationship between an employer and a worker, involving an undertaking on the part of the employer to train the worker in a certain trade and to employ him on stated terms for a given number of years, and on the part of the worker to serve the employer for the agreed period on stated terms. This relationship implies that the employer will give by way of training more than he receives in the way of service, at least during the early years of the relationship. The contract is sometimes embodied in a written agreement which is commonly termed an indenture, although some indentures, the model indenture of the engineering industry for example, are specifically termed "agreements." But indentured apprenticeship is by no means the only form of apprenticeship, and it would be wrong to regard, for example, a decline in indentured apprenticeship as a decline in apprenticeship itself.

Learnership.—A different form of relationship between an employer and a young worker is Learnership. In the enquiry recently undertaken by the Ministry of Labour, but not yet completed, to which reference is made in the first paragraph of this memorandum, it was stated that the word "learner" was used to mean "a worker not being apprenticed who is specifically engaged by the employer for a recognised period of training in the capacity of learner and is provided by the employer with instruction or with definite facilities for learning a branch or process of the industry."

A special form of learnership exists in Trade Board trades, i.e., the trades to which the Trade Boards Acts have been applied. In these trades the rate of wages which must be paid to a juvenile worker varies with the juvenile's status. Broadly, there is a distinction between a relationship in which the employer has, and one in which he has not, an obligation to provide training. If there is such an obligation, the rate of wages is lower than when there is not. The rate is lowest for indentured apprentices. In respect of "learners" such an obligation exists, but it varies among the trades concerned from a requirement that definite training shall be given in prescribed operations to a general requirement that the juvenile shall be provided with facilities for learning the trade. If the required degree of training is not given, the employer is under a legal obligation to pay the juvenile at a rate which is always higher than the learners' rate. In some cases it is the rate for the ordinary adult worker; in others it is a rate intermediate between the learners' and the adult rate. But even in Trade Board trades there is no obligation on the employer to retain the learner in his employment. In Trade Board trades there is a requirement that "learners" shall be registered with the Trade Board.

Journeymen.—The term journeymen is also used somewhat loosely. Strictly speaking, a journeyman is a workman who has completed his apprenticeship, and in certain trades he may also subsequently have passed through a probationary period called "Improvership." The term is also more loosely applied to skilled workers who may have acquired their skill by some alternative method. Latterly, however, the term has been used to denote a skilled worker who is recognised as such and it is so used in this memorandum.

Apprenticeship and the War.—The system of apprenticeship has existed in this country for at least five hundred years, and its history throws some light on apprenticeship of to-day which is still largely traditional in character. It is convenient, however, to begin with the new chapter opened by the Great War; although references to older types of apprenticeship will be made from time to time in later paragraphs of this memorandum.

During the war apprenticeship was interrupted, and the flow of new entrants to a certain extent checked. Mass-production of munitions on a large scale did not lend itself to apprenticeship training, and the high wages offered for repetition work were also a factor in reducing the supply. By the end of the war, therefore, serious questions as to the future of apprenticeship arose.

The Interrupted Apprenticeships Scheme.—The risk of a decline in apprenticeship, with the possibility of a shortage of skilled workers in many of the more important industries of the country, was diminished by the Interrupted Apprenticeships Scheme, the main object of which was to bring back into the skilled trades those apprentices whose apprenticeships had been interrupted by the war. Most

of these men were above the normal age of apprentices, and many of them had incurred family responsibilities and could not be expected to go back at apprentices' wages. With the financial assistance granted by the Exchequer under the Scheme employers were able to pay to these ex-service apprentices wages approximating to those which the apprentices would have obtained if their services had not been interrupted by the war. Directly or indirectly about 100,000 apprentices were prevented by the scheme from drifting into semi-skilled or unskilled employment.

Under the general Interrupted Apprenticeships Scheme, separate schemes for the various industries concerned were drawn up by joint committees of employers and workpeople, after discussions between the two sides and the necessary inquiries into trade customs and practices.

Apprenticeship after the War.—The prolonged period of trade depression which followed the war has tended to confuse and obscure the problems of apprenticeship. No all-embracing inquiry into apprenticeship had been made immediately before or after the war. It is difficult, in consequence, to judge of the extent to which the practice of apprenticeship continues to flourish or to determine with complete accuracy how far the character and distribution of apprenticeship has changed since the war, and how far such changes as are apparent have been due to the war, to trade depression, or to the needs of modern industry. Questions which at some time or another will require answering, and some of which may be answered in part or in whole by the inquiry referred to above, are whether apprenticeship is, in fact, becoming obsolete as is sometimes stated; whether there is a tendency to turn to alternative methods of recruitment; whether indentured apprenticeship is dying out and is being replaced by a type of apprenticeship based on a less formal contract; and, lastly, whether apprenticeship, reinforced by alternative methods for the recruitment of young skilled workers, is likely to provide enough efficient journeymen for the future. No complete answer can be given to these questions, but there is a sufficient body of information available to allow of some account being given of the present state of apprenticeship in this country.

The Extent of Apprenticeship.

Among the principal industries where apprenticeship is the predominant practice are: Engineering and Shipbuilding, Printing, Building, Furnishing, the Wood-working and Allied Trades, Pottery, Vehicle Building, and Bespoke Boot and Shoe making and repairing. It is also found in certain of the Distributive Trades. In other industries such as Coal Mining, Heavy Chemicals and Iron and Steel manufacture, apprentices are only found among the staff employed on maintenance work. Student and pupil apprentices, but rarely trade apprentices, are employed in the Transport industry (particularly Railways) and in the production side of the Chemical Trades.

The question is often asked what percentage of juveniles in employment are apprentices. The results of the general enquiry, which would enable an answer to be given to this question, are not yet available, but from other information it is possible to hazard the conjecture that the total number of male apprentices is in the neighbourhood of 300,000.

Character of Apprenticeship.

The character of present-day apprenticeship in this country can conveniently be discussed under these heads—types of apprenticeship, types of indenture, probation and improvership, length of apprenticeship, wages, and training.

Types of Apprenticeship.—Apprenticeship in this country to-day falls into three main categories in accordance with the force of the obligation to train and to serve: indentured apprenticeship; apprenticeship based on a simple written agreement; and apprenticeship based on a verbal agreement.

It is common in indentures to set out in some detail the conditions under which the apprentice is to be taught his trade; on the other hand some written agreements are of the simplest kind and merely specify the obligation of the employer on the one hand to teach, and of the apprentice on the other hand to learn. In certain trades, an apprentice, on entry, is handed a written document which simply states that the boy has been engaged as an apprentice by the firm. Apprenticeship may also be based merely on a verbal agreement; the conditions of service under such a contract may be in effect similar to those prescribed in an indenture or in a simple written agreement (they are usually the customary conditions of the trade), but obviously a verbal agreement is less binding and less easy to enforce than a written agreement.

Apprenticeship may also be classified in other well-recognised ways. The normal type of apprentice, whether the contract is in the form of an indenture, a simple written agreement or a verbal agreement, is commonly known as a *trade* apprentice; an apprentice who is given a wider training in order to fit him for a supervisory post is known as a *pupil* apprentice; while an apprentice who is undergoing a particular course of study in the works of a firm or a number of firms is known as a *student* apprentice. The terms pupil apprentice and student apprentice are to some extent interchangeable, and a trade apprentice is often called a student apprentice when, as part of his training, he is attending for a definite period the trade classes provided by a Local Education Authority. Finally, a *premium* apprentice is an apprentice in respect of whom a premium is demanded by the employer before the apprentice enters his employment. Premiums are sometimes required from student or pupil apprentices, but premium apprenticeship generally is believed to be dying out except in a few special trades.

Types of Indenture.—An indenture usually contains the first two, and may contain one or more of the following provisions: The employer undertakes to train the apprentice for a definite period of years: the apprentice agrees to serve for the same period: the hours of employment may be stated; the wages for each of the years of apprenticeship may be set out: the parent or guardian may agree to maintain the apprentice: the technical classes which the apprentice is to attend may be specified: and in some trades or districts the apprentice may be forbidden to become a member of a trade union for industrial purposes. A provision is sometimes introduced in certain trades allowing the employer to stand off the apprentice with or without pay during periods of bad trade or for other special reasons.

An exceptional form of indenture is the fourth-party indenture, the third-party being the apprentice's parent or guardian. In such an indenture, the fourth party is usually a voluntary official or trade organisation or the chairman of such a body acting on its behalf. An Apprenticeship Association may be a fourth party, or a Juvenile Advisory or Employment Committee, or a trade organisation such as the Institute of Grocers. The object of the fourth party indenture is to safeguard the apprentice's interests by bringing in a fourth party, who, presumably, should be in a position to ensure that the apprentice is properly treated and trained. In some cases the indenture is drafted in such a way that the apprentice can be transferred from firm to firm so that under the aegis of the trade organisation his training may be as wide as possible.

The drafting of model indentures by organisations of employers for the use (and for the protection) of their members is a practice which has become much more common since the war. In a number of Trade Board trades for example the Board have issued a model form of indenture for their trade. They have indicated which clauses in the form must appear in any indenture for an apprentice who is to be paid at the special low rates fixed for indentured apprentices. The remaining clauses are published as suggestions designed to secure a fair bargain between employer and apprentice.

There has been some demand, especially from such bodies as Juvenile Advisory and Employment Committees, for the issue of a model indenture for general use in all trades, but it is probably true that no model indenture could be issued which would be applicable to most of the apprenticeship industries. What might be more useful for the purpose which the Committees have in mind would be a memorandum pointing out which provisions in an indenture were desirable and which were undesirable or had become obsolete.

Probation and Improvership.—In some industries apprentices are required to serve a probationary period, the length of which varies from one month to two years, but is usually not more than six months. This probationary period is normally included in the

subsequent term of apprenticeship. Some firms, and particularly those which have well thought out schemes for the training of their apprentices, subject their apprentices to a test of knowledge at the end of the period of probation.

A further period of probation is often required after the apprenticeship has been terminated and before the apprentice can become a full journeyman. During this intermediate period the apprentice is called an improver. An improver is paid wages which are intermediate between those of an apprentice and a journeyman.

Length of Apprenticeship.—All apprenticeship agreements specify the period to be served by the apprentice. This period varies from seven to two years or even less. The predominant length of apprenticeship is probably about five years. The length of apprenticeship is, to some extent, traditional (a seven years' apprenticeship was common at least as early as the fifteenth century, and is the minimum provided for in the Elizabethan "Statute of Apprentices"), but in theory, if not in practice, the length of apprenticeship in a particular trade is based on the time required to train the apprentice in that trade.

The question of the length of apprenticeship is not, however, quite so simple as would appear at first sight. The length is necessarily affected by certain factors which determine the age of entry and the age of completion. The age of entry cannot, of course, be below the school-leaving age, and should not be lower than the age at which the boy or girl is physically capable of doing the work of the particular trade. The age of entry is also limited in certain cases by legislation as, for example, the Employment of Women, Children and Young Persons Act, 1920, which, among other things, imposes restrictions upon the employment of persons under 18 on night work. In some industries the age of entry is not definitely fixed, i.e., the boy can enter at any age up to a specified maximum, but the age of completion is fixed. The length of apprenticeship, therefore, in such a case varies with the age of entry. In other industries the length is fixed and the age of entry, and not the age of completion. In general the age of completion is not later than 21.

The age of entry into apprenticeship is a matter of some importance. If it is below $16\frac{1}{2}$, the secondary school boy is shut out and if it is below $15\frac{1}{2}$, the central school or junior technical school boy. This is recognised in some industries, the Printing industry for example, and an exception to the normal age of entry is made in the case of a boy who has continued his education after the statutory school-leaving age. Similarly, the age of entry for student apprentices may be anything from 18 up to 21 in the case of those who have a University degree. Probably the commonest age of entry for trade apprentices is from $14\frac{1}{2}$ to 16 inclusive; in a few cases only is it 17 or above. The lower age is more common in the Printing and Building industries and 16 in the Shipbuilding industry.

Another aspect of this question which is sometimes overlooked is the relation of the age of entry to the industrial qualifications of the recruit. In some industries there is a gap between the statutory school-leaving age and the minimum age of entry into apprenticeship, and one of the problems of Juvenile Advisory and Employment Committees is to secure that boys who enter temporary employment on leaving school with a view later to becoming apprentices do, in fact, transfer from their temporary employment when the time comes.

Wages.—Apprenticeship wages vary widely from district to district and, of course, from industry to industry. In practically all establishments where apprenticeship agreements exist, the wages to be paid to the apprentice during each of the years of apprenticeship are stated, or understood. There is frequently a standard wage for each year of apprenticeship; in some industries this wage is a definite fraction of the approved journeyman's rate.

The low wages often paid to apprentices are based on the principle that during the first years of apprenticeship the apprentice is a liability and not an asset, and that the employer necessarily gives more in training than the apprentice provides in service. During the latter years of apprenticeship, the wages are fixed on such a basis as will enable the employer to be recouped to some extent for the time and trouble spent on the apprentice during the first years.

Training of Apprentices.—The training of apprentices in the shop may be given in one or more of several ways. The traditional method is for the apprentice to work alongside or under the supervision of a journeyman; but under post-war conditions, and especially with short hours and increased subdivision of operations, it is both more difficult and more expensive to allocate any considerable part of a journeyman's time to giving the apprentice an all-round training. Moreover, if the journeyman is on piece-work, there may be a strong financial inducement for him to spend as little time as possible on the training of the apprentice unless and until the apprentice becomes a productive unit and the journeyman gets the benefit of his production.

Another method is for the apprentice to work directly under the control of the foreman, or, in smaller establishments, of the employer himself. Alternatively, apprentices may be instructed by specially qualified foremen or journeymen exclusively charged with this duty. A more definite variation of the last method is to be found in the "nursery" or works school where all the apprentices of a firm receive systematic training under the firm's own instructors. This method, which is practicable in large firms only, has the added advantage of enabling apprentices to be drafted, after a short period of preliminary instruction, into the trades best suited to their individual capacities.

Workshop training is necessarily related to technical instruction, that is, the instruction in technical matters provided by or under the supervision of a local Education Authority. Technical instruction is provided in one or more of several ways. The "sandwich" system may be adopted which allows the apprentice to spend alternate periods, usually of some weeks, in a shop and in the technical school. The younger apprentices may be released for one or two half-days a week in order that they may attend classes. Apprentices may be allowed to leave work early on those nights when they attend for instruction at the technical school. Classes may be organised either by the Education Authority or by the firm under the general direction of the Education Authority.

The extent to which technical instruction should supersede or supplement workshop training is a question upon which thoughtful employers find it difficult to make up their minds. Technical instruction in this country has been recently expanding, and further experience and consultation between educational and industrial experts may show what is the ratio for each industry. But there is evidence that an increasing and, by now, substantial number of employers are encouraging their boys in training to take advantage of the technical facilities afforded by the Education Authorities. An appreciable proportion of employers allow time off, pay class fees, or give prizes or increases in wages for satisfactory progress at the classes, while in a few cases attendance at technical classes is a provision of the indentures.

Supply of Apprentices.

It is convenient at this point to pass from the present character of apprenticeship in this country to questions concerned with the supply of apprentice labour and methods of recruitment. The main source of supply is necessarily those boys and girls who have left school and have been in employment for one or two years, since the age of entry into apprenticeship is, in general, higher than the age at which boys and girls leave the elementary schools. The kind of work upon which the apprentice is engaged before he becomes an apprentice materially affects his usefulness, particularly during the first years of apprenticeship. A boy who was in steady employment before he became an apprentice is obviously better material for training than the boy who was engaged on work of a casual or seasonal character. Again, it is clearly to the advantage of the employer that the prospective apprentice should have been engaged on work which, even if of an unskilled type, has some relation to the trade in which it is intended that he should be trained. One would have expected, therefore, that employers would arrange to recruit their apprentices, so far as might be practicable, from among the juvenile workers in their own trade, but it is doubtful whether this practice is common It is true that a proportion of boys would

not be of a suitable type, while the number of apprentices recruited is substantially less than the number of unskilled juvenile workers concerned. It has often been suggested, however, that this method of recruitment might be examined by employers with advantage both to themselves and to the boys employed by them. An extension of the practice would also have a definite bearing on the problem of what is commonly called "blind alley" employment.

The other source of supply is the schools. The minority of apprentices are recruited direct from Central, Secondary, or Junior Technical Schools,* or, in the case of student or pupil apprentices, from the Universities and Technical Colleges. Reference has already been made to the bearing of the age of entry into apprenticeship on the question of obtaining a sufficient supply of boys who have received some form of higher education; and the problem of relating the age and conditions of entry to the ages at which boys normally leave schools and colleges other than the elementary schools is one which the employers and education authorities may be compelled to examine with some care if the quality of apprentice labour is to be maintained or raised.

It is believed that, in general, employers during recent years have had little or no difficulty in obtaining the number of apprentices whom they required. On the other hand, it is frequently stated that the number of apprentices engaged since the war has been restricted both by the hesitation of employers to engage apprentices, and by the reluctance of boys to bind themselves as apprentices.

In view of the likelihood of a revival of trade and in view of the coming decrease in the number of juveniles available for employment resulting from the fall in the birth-rate (a problem which will be referred to later in this memorandum), the factors which make for restricted recruitment are sufficiently important to require analysis.

During the period of trade depression some employers may have been reluctant to take on the full number of apprentices whom they would have engaged in normal times, partly because of the large number of skilled workers unemployed, and partly because of the uncertainty of their having sufficient orders to keep their apprentices occupied. It is, however, noticeable that, despite these facts, a certain number of employers have been able to take on their full complement of apprentices.

A number of factors account for the reluctance of boys to become apprentices. The difference between the wages which boys can earn in non-apprenticed employment in the trades catering entirely or primarily for the home market, and the wages which are commonly offered to apprentices in other trades is now probably greater than before the war. Widespread unemployment, and the consequent

* See pages 162-3.

greater dependence on the boy's earnings, make juveniles and their parents prefer the relatively higher immediate wages of non-apprenticed employment, while the unemployment in certain trades deters juveniles from entering them as apprentices or otherwise.

In the absence of accurate and comprehensive information, it is very difficult to determine how far the present supply of apprentices in the various industries is sufficient to secure an adequate supply of skilled workers in the future, or to forecast whether industry, when trade revives, will find itself with a shortage of journeymen owing to the various causes which may have operated to diminish the number of recruits. The possibility of such a shortage is sufficiently serious to make it necessary for employers to consider the position very carefully.

The number of boys and girls becoming available for employment is in process of gradual diminution and the fall in the birth-rate during the war years will accentuate, in the years 1931 to 1934, the reduction in the numbers.

In table I appended hereto (page 150) are given estimates of the numbers of boys and girls who will attain the ages of 14, 15, 16 and 17 in each of the years 1926 to 1940. Whereas in 1926 there were in Great Britain 1,619,000 boys and 1,610,000 girls of these ages, it will be seen that in 1933, the year of lowest level, the numbers will be only 1,275,000 boys and 1,268,000 girls, a reduction of 344,000 in the number of boys and of 342,000 in the number of girls. From 1934 onward to 1937 the position will temporarily improve, as a result of the high birth-rates of 1920 and 1921, to near the level of 1926, but from 1937 onward the normal decline in the birth-rate will resume its influence.

In the second table (page 151) the numbers are given of boys and girls in the age group 14 to 17 who are likely to come into the category of "occupied" persons in each of the years 1926 to 1940. This table has been derived from the previous one on the assumption that the ratio of "occupied" juveniles to total juveniles will be the same, throughout the period, as it was in 1921. This assumption may not be borne out by events. Changes in the state of trade and of general prosperity, or in the terms offered by employers to juveniles, or in the number of juveniles continuing to attend school above the age of 14 compulsorily or voluntarily, might cause a larger or smaller proportion of all juveniles to enter the "occupied" class. The figures are given, however, as indicating more nearly what the actual reduction in the numbers of juveniles available for employment will be, and it will be seen that on these assumptions there are likely to be 259,000 fewer "occupied" boys and 186,000 fewer "occupied" girls in 1933 than there are to-day. Again, from 1934 onwards there will be a recovery towards the 1926 level, which will be approximately reached in 1937, to be followed by a decline.

The above figures leave out of account the number of juveniles unemployed. This number at the present time is considerable and serves to reduce the shortage just indicated. At the same time, owing to the immobility of juvenile labour, it has to be remembered that a general shortage may be accentuated in particular places, and yet may be quite consistent with a surplus elsewhere.

In considering the relation of these figures to the problem of apprenticeship it should be borne in mind that, among the youths in the country between the ages of 14 and 21, there are probably seven non-apprentices to every one apprentice. The area from which additional apprentices could be drawn is therefore large, and the problem will be one rather of a general shortage of juvenile labour than a particular shortage of apprentices. No doubt industry will adjust itself in some way to meet these circumstances, particularly if the coming shortage is realised in advance.

Method of Recruitment.—The growing decrease in the number of juveniles available for employment adds to the importance of the methods which are adopted for the recruiting of apprentices. Normally, firms recruit their apprentices from among those who apply at the works, giving definite preference to sons or employees or boys recommended to them by their workers, and particularly by their foremen. In some instances apprentices are selected from the unskilled or semi-skilled juveniles already in the employment of the firm. A number of firms make use of the local Employment Exchange or Employment Bureau, where a wider choice is available. There are obvious advantages in this method if, as is frequently the case, the Exchange or Bureau is in touch with most of the boys and girls who leave school in the area, and remains in touch with them for a year or two under some scheme of after-care or industrial supervision.

Recruitment is largely automatic when apprentices are obtained from such schools as Junior Technical Schools, the whole output of which is normally absorbed by industry, or from voluntary Day Continuation Schools, as in London, where specialised training is given in consultation with the trade concerned.

It is believed that most firms leave the engagement of apprentices to their foremen who select the boys and girls after a brief interview, but there is apparently a growing tendency to substitute for this traditional method a more scientific method of selection. Careful attention to the process of selection tends substantially to reduce subsequent wastage. In some firms the apprentice may be selected by a special apprentice supervisor or welfare officer; in others the applicant may be tested in accordance with the principles of the National Institute of Industrial Psychology* either by the Institute's own experts or by an apprentice supervisor trained by the Institute.

* See page 264.

Some firms, again, require candidates to pass a simple examination. In the case of student or pupil apprentices the candidate may be required to pass one or more of a number of approved examinations, or even to have obtained a university degree.

The General Post Office have an arrangement under which they will only consider applications for appointment to the grades of boy messengers, girl probationers and telephonists if the applications come through the Employment Exchange or Bureau; but the Postmaster-General retains the right of selecting candidates, and preference is given to the children of deceased Post Office servants, and, as regards boy messengers, other things being equal, to War orphans.

Attitude of Organised Industry.

Employers' Organisations and Apprentices.—It is now necessary to pass to questions arising out of the attitude towards apprenticeship of organised industry, that is, of employers' organisations, trade unions, joint industrial councils, and trade boards. In the past there has been a tendency on the part of some employers' organisations to leave the consideration of questions of apprenticeship, including such questions as the provisions contained in indentures, to the individual members of organisations, although, as has already been mentioned, certain employers' organisations or groups of employers within such organisations have drafted model indentures for the guidance of their members. In some cases employers' organisations are parties to agreements in which the rules of trade unions regarding apprenticeship are embodied, or the organisations recognise these rules and thus become jointly responsible for them.

Trade Unions and Apprenticeship.—In most industries apprentices are not members, or at least full members, of the trade unions concerned. (In some, they are forbidden by the terms of their indentures from becoming members of trade unions for industrial purposes.) But some unions claim a direct interest in apprenticeship, even although apprentices may not be contributors to their funds. In some industries trade unions have rules relating to the length of apprenticeship, the age of entry into apprenticeship, the wages to be paid to apprentices, and the ratio of apprentices to journeymen. These rules may be embodied in agreements made with employers' organisations, as in the case of the printing and building industries, may be recognised by employers, but not embodied in joint agreements; or may not be recognised by employers at all. In certain industries, for example the printing industry, the trade unions co-operate closely with employers and with local education authorities in the workshop training and particularly the technical instruction of apprentices.

In general the influence of trade unions has helped to arouse interest in the training of apprentices, while in some industries, for example printing, the discussions on apprenticeship questions between employers' associations on the one hand and trade unions on the other have been of value in creating an atmosphere of goodwill.

Joint Industrial Councils.—The following Joint Industrial Councils particularly concern themselves with apprenticeship, or have done so at one time or another—Pottery, Printing, Building, Heating and Domestic Engineering, Paper, Cooperage, Electricity Supply, Electrical Contracting, Flour Milling, Needles and Fish-hooks, Surgical Instruments, Vehicle Building, and Optical Instrument Manufacture. Some of these Councils have appointed Apprenticeship Committees, while others have Education Committees, which deal with workshop training and the provision of technical instruction to workers in the trade, and particularly young workers.

Trade Boards.—Trade Boards are still more closely concerned with apprenticeship, since they have the power, subject to the approval of the Minister of Labour, to fix minimum rates of wages applicable to apprentices and learners respectively, and to determine the conditions under which they are trained. The following Boards have prepared schemes for the training of apprentices—Boot and Shoe Repairing, Brush and Broom, Flax and Hemp, Perambulator and Invalid Carriage, Retail Bespoke Tailoring, and Tobacco.

Alternative Methods of Recruiting and Training.

Upgrading.—In certain trades the practice of upgrading unskilled or semi-skilled workers is probably becoming more common than it was before the war. Semi-skilled and unskilled men naturally acquire some acquaintance with the work which is being done by the skilled man, and they may be able after some years' experience to do a specialised range of the work of the higher grade man, either at once or after a short period of intensive training. This method of recruiting and training is peculiarly applicable to those trades in which large scale machine production has reduced the amount of skill required. Again, in certain trades it has this substantial advantage from the point of view of the employer, that the workman during his period of training has some productive value, while the time of the journeyman need not be spent in initiating young apprentices into the mysteries of a craft.

Another system of recruiting from adult workers may be found in the training in Government Training Centres, or elsewhere, of young workers who are above the normal age of entry into apprenticeship. Experience in the training of disabled ex-Service men has shown

that in certain trades it is possible by intensive methods of training to produce a competent craftsman even if he does not begin his training until well after the normal apprenticeship age. In theory, therefore, there is no reason why in certain trades the ranks of skilled workers should not be augmented by the supply of young workers, hitherto unemployed or employed on unskilled or semi-skilled work, who have been given an intensive course of training.

Learnership.—An attempt was made earlier in this memorandum to differentiate learnership and apprenticeship. It may be pointed out here that learnership in certain industries, notably cotton, constitutes the regular avenue for the recruitment of skilled workers, and in other industries for the recruitment of semi-skilled workers, and, in still others it is an avenue alternative to apprenticeship for the recruitment of the skilled worker. Another form of learnership is Trade Board learnership, which has already been mentioned. A very few instances occur of young workers being called learners, although they should be termed apprentices under a verbal agreement, if the definition of apprenticeship contained in this memorandum is accepted.

It is sometimes suggested that the minute sub-division of occupations in modern methods of production has led to the appearance of a new class of juvenile worker, the " learner," who is described as a kind of low-grade apprentice. This may be true in part, but what has probably happened also is that the use of the expression for Trade Board purposes, the tendency more closely to define industrial terms and the prominence given to the term in official questionnaires, have led employers and others to classify most of their juvenile workers, who were receiving any kind of training, as learners.

To survey the conditions of learnership in its various forms would be to go beyond the scope of this memorandum. For purposes of comparison, however, a few general statements may be made.

The learner enters employment as soon as possible after leaving school ; in heavy trades he is not engaged until a later age, when he is supposed to be physically capable of doing his work. The period of learnership is in some trades in itself a probationary period, but in other trades the boy or girl is engaged for a few months " on probation." The duration of the learnership varies with the time taken to become proficient in the trade, but the learner is engaged at a week's or even a day's notice. The learner's wages are, in general, higher than those of the apprentice, since the learner in the nature of things becomes a productive unit at an earlier date. The learner is almost invariably trained only by being placed alongside an adult worker ; if, as is often the case, his work requires little skill, he may be given some training with his fellow recruits and then left to shift for himself. Occasionally he is encouraged to attend technical classes.

APPENDIX I.

(Great Britain.)

Estimated Numbers of Juveniles who will attain the Ages of 14, 15, 16 and 17 years during each of the 15 years 1926 to 1940 on the assumption that the 1921 mortality and the average migration of the years 1921–1925 are experienced.

MALES (Thousands).

Age	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.	1934.	1935.	1936.	1937.	1938.	1939.	1940.
14 . .	399	401	400	390	361	335	292	298	444	409	401	373	356	351	347
15 . .	400	397	399	398	388	359	334	290	298	441	408	398	371	355	350
16 . .	407	398	395	397	396	387	357	332	290	296	439	406	397	368	353
17 . .	413	404	396	393	395	394	380	358	330	288	294	437	404	394	366
Totals	1,619	1,600	1,590	1,578	1,540	1,475	1,363	1,278	1,362	1,434	1,542	1,614	1,528	1,468	1,416

FEMALES (Thousands).

14 . .	394	401	403	391	357	332	291	294	434	402	395	367	353	347	342
15 . .	399	393	400	401	389	356	331	290	294	433	400	393	365	351	345
16 . .	405	398	392	398	400	388	355	330	290	293	431	399	391	364	350
17 . .	412	404	396	390	397	398	386	354	328	288	294	430	398	390	363
Totals	1,610	1,596	1,591	1,580	1,543	1,474	1,363	1,268	1,346	1,416	1,517	1,589	1,507	1,452	1,400

MALES AND FEMALES (Thousands).

14 . .	793	802	803	781	718	667	583	592	878	811	796	740	709	698	689
15 . .	799	790	799	799	777	715	665	580	592	874	808	791	736	706	695
16 . .	812	796	787	795	796	775	712	662	580	589	870	805	788	732	703
17 . .	825	808	792	783	792	792	770	709	658	576	585	867	802	784	729
Totals	3,229	3,196	3,181	3,158	3,083	2,949	2,730	2,543	2,708	2,850	3,059	3,203	3,035	2,920	2,816

APPENDIX II.

(Great Britain.)

Estimated Numbers of Juveniles aged 14–17 years estimated as likely to be "occupied" in each of the fifteen years 1926–1940, on the assumption that the ratios of "occupied" juveniles to total juveniles in the years in question will be the same as in 1921

MALES (Thousands).

	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.	1934.	1935.	1936.	1937.	1938.	1939.	1940.
14	258	259	259	252	234	217	189	193	287	265	259	241	230	227	225
15	259	257	258	257	251	232	216	188	193	285	264	257	240	230	226
16	372	364	361	363	362	354	326	302	265	271	401	371	363	335	323
17	377	369	362	359	361	360	351	324	302	263	269	400	369	360	335
Totals	1,266	1,249	1,240	1,231	1,208	1,163	1,082	1,007	1,047	1,084	1,193	1,269	1,202	1,152	1,109

FEMALES (Thousands).

14	176	179	180	175	160	148	130	132	194	180	177	164	158	156	153
15	178	176	179	179	174	159	147	130	131	194	179	176	163	157	154
16	288	283	279	283	285	276	253	235	206	208	306	284	278	259	249
17	293	288	282	278	283	283	275	252	233	205	207	306	283	277	258
Totals	935	926	920	915	902	866	805	749	764	787	869	930	882	849	814

MALES AND FEMALES (Thousands).

14	434	438	439	427	394	365	319	325	481	445	436	405	388	383	378
15	437	433	437	436	425	391	363	318	324	479	443	433	403	387	380
16	660	647	640	646	647	630	579	537	471	479	707	655	641	594	572
17	670	657	644	637	644	643	626	576	535	468	476	706	652	637	593
Totals	2,201	2,175	2,160	2,146	2,110	2,029	1,887	1,756	1,811	1,871	2,062	2,199	2,084	2,001	1,923

Note.—These Tables have been prepared by the Ministry of Labour after consultation with the Registrar-General [illegible]

Apprenticeship in H.M. Dockyards.

[*Furnished by the Admiralty.*]

The Board of Admiralty have for long regarded the training of the skilled workmen in the Royal Dockyards as of special importance. Although workmen who have served an apprenticeship elsewhere are not excluded from the Royal Dockyards, and although probably the majority of those actually employed as operative workmen have received their early mechanical training in private establishments, the Admiralty have always arranged for the entry year by year of a number of apprentices, so as to provide a supply of competent mechanics with special knowledge of Dockyard work in the various trades required in the Dockyards. The number is limited because the Admiralty wish to avoid as far as possible being compelled to discharge ex-apprentices when it becomes necessary to reduce numbers in particular trades. The Draughtsmen employed in the Constructive, Engineering and Electrical Departments of the Dockyards, or in the corresponding Departments at the Admiralty, and the subordinate technical officers in the Dockyards are nearly all appointed by examination from men who have been trained as Dockyard (trade) Apprentices. Further, all the higher technical posts in the Constructive Departments of the Dockyards, on the Constructive side of the Dockyard Department and in the Naval Construction Department at the Admiralty, are filled by members of the Royal Corps of Naval Constructors, a Corps which has been recruited mainly from Dockyard Apprentices, who on account of their special ability and progress in their technical studies at the Dockyard Schools have been awarded Admiralty scholarships tenable at the Royal Naval College, Greenwich. This will serve to show the great reliance placed by the Admiralty on the system of training for Dockyard Apprentices.

Apprentices are entered every year at each of the Home Dockyards (Portsmouth, Chatham, Devonport, and Sheerness). Entry is by competitive examination conducted by the Civil Service Commissioners. The limits of age are 15 to 17 ; they were formerly 14 to 16. Competition for vacancies is keen and the standard reached is high. The subjects of examination are Arithmetic, Mathematics, English, History and Geography, Science and Drawing ; successful candidates have usually attended a Secondary School.

Apprentices pass a medical examination on entry and are indentured. The period of apprenticeship was originally seven years. It was reduced to six years in 1890 and to five in 1918. The training consists partly of practical instruction in the chosen trade, and partly of a course of education in the Dockyard Schools. A selected workman is assigned to act in the capacity of instructor (whilst continuing to perform productive work) to each apprentice for the first four years. According to their place in the entrance examination, apprentices are allowed to choose their trade and are sent to the

Upper or Lower School, although boys who do exceptionally well in the Lower School may subsequently be sent to the Upper School. Upper School apprentices receive 12 hours' instruction each week (six inside and six outside working hours) and Lower School apprentices seven (three inside and four outside working hours). The curriculum of the Upper School is set out in the following table :—

First Year.	Second Year.
For apprentices of all trades. English. Practical Mathematics Elementary Science. Mechanics.	For apprentices of all trades. English. Practical Mathematics. Mechanics. Heat and Metallurgy. Mechanical Drawing.

Third Year.	Fourth Year.
For apprentices of all trades. Practical Mathematics. Applied Mechanics. Electricity. Mechanical Drawing.	For apprentices of all trades. Practical Mathematics. Applied Mechanics. Electricity. Mechanical Drawing. Heat and Metallurgy.
Professional Subjects :— For engine fitter apprentices and those of kindred trades and electrical fitters. Steam and Heat Engines.	Professional Subjects :— For engine fitter apprentices and those of kindred trades. Steam and Heat Engines. General Engineering.
For engine fitter apprentices and those of kindred trades. General engineering.	For electrical fitter apprentices only. Electrical Engineering.
For shipwright apprentices and those of kindred trades. Naval Architecture.	For shipwright apprentices and those of kindred trades. Naval Architecture.

The curriculum of the Lower School is on much the same lines as that of the Upper School, though the work is more elementary.

Mr. Baxendall, H.M.I., of the Board of Education, makes the following comments on the course in his pamphlet on the Admiralty method of training Dockyard Apprentices :—

"The aim of the work in English is to cultivate the power of clearly expressing ideas in writing. Lectures on subjects of general interest and educational value are given, and are followed by the

writing of essays on these and other subjects. A special period in History is studied and dealt with on the lines of Green's Short History of the English People, the growth of the Nation, its constitutional, social, and intellectual advance being considered. The literature of the period is studied, and passages read and explained to the boys.

"The mathematical work of the first two years is much on the lines usually followed in a course of Practical Mathematics, an all-round knowledge of the subject being given. By the end of the second year considerable progress has been made with the differential and integral calculus. Each branch of the subject is developed in the third and fourth years, co-ordinate geometry of two dimensions and also of three dimensions being studied, while the fourth year work in calculus includes double and triple integration and differential equations, with applications to physics and engineering. From one-third to one-half of the total time is devoted to the subject in the first two years. The standard attained is exceptionally high, and is probably not exceeded in any existing educational institution, if regard is had to the age of the boys and the schools from which they are drawn, and to the fact that they are receiving a part-time training. There can be little doubt that the excellent mathematical training which the apprentices receive in the Dockyard Schools accounts for the rapid progress which they are able to make in the study of their engineering subjects, and for their confidence and power in attacking problems."

All the apprentices attend school for the first year. At the end of the year, those who have done creditably attend school for a second year, while the remainder go back to their tools. At the end of the second and third years there is a similar selection and only the most promising lads remain for a fourth year. Fourth Year Apprentices who have made satisfactory progress in their trade and in school receive special instruction in Drawing, and apprentices who show special aptitude in Drawing are employed in the Drawing Office for six months.

At the end of the fourth year of school a final examination is held, and the Shipwright Apprentice who obtains highest marks in all the Dockyards is recommended for a Cadetship in Naval Construction. The cadet receives a year's course of combined theoretical and practical instruction at one of the large Home Dockyards and is then sent to the Royal Naval College, Greenwich, as a Probationary Assistant Constructor for a further course of study. If he passes successfully through this course he is appointed an Assistant Constructor in the Royal Corps of Naval Constructors and the highest posts in that Corps are open to him. In other professions, as in Engineering and Architecture, there is a great gulf fixed between the workman and the professional man; the Admiralty select their professional Naval Architects from their Shipwright Apprentices. Five Directors of Naval Construction, two Directors of

Dockyards and a number of other distinguished shipbuilders and naval architects have commenced their professional careers as dockyard apprentices.

Electrical Fitter Apprentices have an opportunity for competing for an Admiralty scholarship in Electrical Engineering and the successful candidate may be selected, after a three years' course at Greenwich, for the post of Assistant Electrical Engineer in a Dockyard, but there are not so many openings of this kind as on the Constructive side.

There is no similar scheme of training for Engineering Apprentices, as the higher posts in the Engineering Departments of the Dockyards and at the Admiralty are filled by Naval Officers; but apprentices in engineering and other trades who show promise are allowed to transfer at the end of their second year to the Constructive Branch and thus become eligible for Construction Cadetships. Apprentices who fail to win Admiralty Scholarships usually compete for Royal Scholarships, Whitworth Exhibitions and other Scholarships tenable at Universities and Technical Colleges. The Admiralty place no obstacle in the way of these successful candidates, many of whom do not return to the Admiralty Service but obtain responsible positions elsewhere, some with private firms, some in the scholastic field, and many in other Government Departments.

Those apprentices who have not succeeded in obtaining Cadetships or Scholarships are graded as workmen in their respective trades on the conclusion of their apprenticeship; they are then eligible to compete in examinations for various subordinate official positions such as those of Draughtsmen and Inspectors of Trades; and subsequently for posts as Foremen. Some of the Foremen may be advanced to the rank of Senior Foremen of the Yard Promotion by competitive examination is the rule in the subordinate grades of the Dockyard Service, and though workmen who have not served an apprenticeship in the Dockyards are not excluded from the examinations, ex-apprentices who have attended the Dockyard Schools are shown by results to possess an immense advantage over other candidates.

Even when the ex-apprentice remains a workman he (as well as the Service) benefits by the training which he has received. The educational and technical standards of ability of the Dockyard trained mechanic are probably higher than those of any other class of mechanic in Great Britain.

Dockyard Schools have also been established in the Yards abroad, but the training is not of such a high standard as at home, and there are not so many openings for ex-apprentices.

In addition to apprentices, other boys are employed in the Dockyards and Naval Establishments as Storehouse Boys and Yard Boys. Storehouse Boys are trained to become Storehouse Assistants and Storehousemen. The Yard Boys usually become semi-skilled operative workmen. These lads are on a lower educational standard

on entry than the apprentices, and are not indentured; they are not admitted to the Dockyard Schools, but of late years the Admiralty have agreed to pay the school fees of those who desire to attend evening classes, and a great number of the boys have taken advantage of this offer. The educational facilities afforded to the Yard Boys and Storehouse Boys have proved of considerable benefit to the Service, especially in the case of the Storehouse Boys who are employed in the Supply Departments, where a fairly good standard of general and technical education is required of the Storehousemen placed in charge of a great variety of stores.

It may be of interest to state that the Dockyard Schools were first established in 1843; promotion by examination became the rule in 1847; the Royal School of Naval Architecture and Marine Engineering (which preceded the Royal Naval College, Greenwich) was founded in 1864, and the Royal Corps of Naval Constructors was formed in 1883. It may not be out of place to mention here that up till the middle of the nineteenth century France had been pre-eminent in warship design; but the superiority has since been transferred to this country.

DOCKYARD APPRENTICES.

(*Numbers employed and attending Dockyard Schools*, 1926.)

	Portsmouth.		Devonport.		Chatham.		Sheerness.	
	Total employed.	Numbers attending School.	Total employed.	Numbers attending School.	Total employed.	Numbers attending School.	Total employed.	Numbers attending School.
Sailmakers ..	3	1	4	3	4	2	1	—
Ship Fitters ..	32	15	21	12	18	11	5	3
Joiners ..	16	10	10	9	8	5	3	3
Painters ..	10	2	2	2	3	1	2	—
Plumbers ..	9	7	4	4	3	1	3	1
Shipwrights ..	157	73	151	63	111	49	21	11
Shipwrights (Naval)	30	18	24	15	39	23	—	—
Smiths.. ..	8	3	10	3	10	3	3	—
Boilermakers ..	35	16	22	18	16	11	4	2
Coppersmiths..	13	7	12	7	10	7	4	2
Enginefitters ..	87	82	70	49	94	56	19	11
Founders ..	7	3	6	4	8	4	2	—
Pattern makers	6	6	6	6	5	3	3	2
Electrical fitters	129	74	95	81	29	29	11	11
Drawing Office (all trades)	43	—	53	—	14	—	4	—
Total employed	585	—	490	—	372	—	85	—
Numbers attending School	—	317	—	276	—	205	—	46

Apprenticeship in the Mercantile Marine.

(*Furnished by the Board of Trade.*)

The system of apprenticeship in the Mercantile Marine exists for the purpose of training boys to be deck officers. The ranks of engineer officers are recruited from among persons who have served their apprenticeship in workshops on shore; and employment in other capacities on board ship is not, under modern conditions, preceded by apprenticeship, the practice of apprenticing boys to the sea service with a view to their becoming able seamen being now obsolete.*

The system is of old standing and has for long been the subject of statutory provisions. The legal position of apprentices is now governed by the Merchant Shipping Act, 1894, which contemplates that all apprentices should be indentured and provides that Superintendents of Mercantile Marine Offices (who are officers of the Board of Trade) shall give to persons desirous of apprenticing boys to, or requiring apprentices for, the sea service such assistance as may be in their power. The indentures of apprenticeship must be registered by a Superintendent or by the Registrar-General of Shipping and Seamen (who also is an officer of the Board of Trade) and particulars of the apprentices carried on board any ship, together with their indentures, must be produced to a Superintendent before the ship proceeds to sea from a port in the United Kingdom.

The indenture of apprenticeship to the sea service is normally a tripartite contract between the "Master" (that is the Shipowner), the apprentice, and the apprentice's parent or guardian; and the form generally employed is one issued by the Board of Trade, or an approved adaptation of it. The indenture binds the apprentice to give faithful service to the master for the agreed period and contains provisions against misbehaviour. The master, for his part, is bound to provide the apprentice while at sea with quarters, food, medical attendance, etc., and to teach him the business of a seaman.

* It may be mentioned, however, that the various training ships and nautical schools supply boys to the sea service, though the training given is quite distinct from apprenticeship and varies in degree among the different institutions. In 1925, the latest year for which figures are available, the total number of boys from training ships and resident nautical colleges sent to sea in the British Mercantile Marine was 1,484. This figure does not include boys from the "Conway," "Worcester," and "Mercury," or the Nautical College, Pangbourne, who go to sea as apprentices or cadets; nor does it include boys who have attended nautical courses at Junior Technical Schools.

The period of apprenticeship is governed by the length of time necessary to qualify the boy for examination for his first certificate of competency as an officer of the Mercantile Marine. The Master and senior officers of every foreign-going ship are required by law to hold certificates issued by the Board of Trade after examination and, in general, no one can be admitted to examination for the certificate of lowest grade (that of Second Mate) until he has served for four years at sea. In order, however, to encourage apprenticeship, the Board of Trade regulations provide that the whole time under indentures may be counted as sea service so long as not more than one-fifth of that time has been spent in home ports. In the cases of boys who have spent two years or more in an approved training ship or nautical school reductions are allowed in the prescribed period of qualifying service, and hence in the period of apprenticeship, which may thus be shortened to three years.

The normal age of entry as an apprentice is between 16 and 17 years. Of the 3,579 apprentices who were actually on board ship on the 19th June, 1921 (the last date on which detailed particulars are available), 2,830 were between the ages of 16 and 20 and 600 were over 20.

The premium required and the wages paid to apprentices vary with the different shipping companies. Formerly many of the big passenger lines demanded substantial premiums, but the tendency nowadays is to charge only a small premium or no premium at all. Wages are generally paid. Many of the passenger lines maintain a system of careful selection of apprentices with a view to training them for permanent service in the company's ships. One of the largest passenger lines has recently instituted a scheme of three-yearly apprenticeships for boys from approved training establishments: no premium is required, and the annual payment to the apprentices increases from £15 in the first year to £25 in the third year. This scheme also contains special provision for the continued employment of the youths in the company's steamers after they have obtained their certificates as Second Mate, the employment being so arranged as to provide the experience necessary to enable them to qualify for certificates of higher grade with the minimum of delay.

The following table shows the number of apprentices' indentures registered in each year since 1911 as compared with the number of candidates who obtained certificates as Second Mate. For the last five years the number of successful candidates who performed their qualifying sea service as apprentices or cadets has been ascertained separately and is shown in the table: it will be seen that a large majority of the successful candidates qualified for examination in this way. (A cadet is a boy who is trained in the same way as an apprentice, without actually being under indenture.)

Year.	Number of Indentures.	Number of Candidates successful for Second Mate's Certificate.	
		Total Number.	Previously served as apprentice or cadet.
1911	1,306	826	Not available
1912	1,461	795	,,
1913	1,494	866	,,
1914	1,345	760	,, ,,
1915	1,232	744	,, ,,
1916	1,403	890	,, ,,
1917	1,106	934	,, ,,
1918	1,677	849	,, ,,
1919	1,865	904	,, ,,
1920	1,494	896	,, ,,
1921	1,163	877	715
1922	1,245	929	769
1923	1,323	1,149	1,007
1924	1,300	1,086	927
1925	1,308	921	768

The relation between the number of apprentices serving and the total number of deck officers on foreign-going ships (to which the apprenticeship system is almost entirely confined) can be inferred from the following table, which has been compiled from the quinquennial returns of seamen employed. The figures represent the number of persons, in each grade, who were actually employed on foreign-going ships on a particular day in each year. They, therefore, represent only a proportion (something like 80 per cent.) of the total number of persons employed in such ships in each grade throughout the year.

Year.	Masters.	Mates.	Apprentices.
1891	4,465	9,620	3,619
1896	4,301	9,921	4,166
1901	3,792	9,469	2,874
1906	4,040	10,126	2,981
1911	3,903	9,914	3,304
1921*	1,935	5,825	3,507

Finally, it may be observed that apprenticeship to the sea service is not governed by any trade union rules. Subject to the provisions of the statute, which are explained above, the conditions of

* The figures for 1921 are abnormal, as they relate to a date when acute depression, accentuated by a coal stoppage, existed in the shipping industry.

apprenticeship are governed by the terms of the indenture, which are a matter for arrangement between the parties, although in practice they are to a large extent standardised except as regards premium and wages.

Apprenticeship in the Pilotage Service and in the Sea Fishing Service.—In certain pilotage districts, including Cardiff, the Humber, Liverpool and the Tyne, there is a system of apprenticeship, regulated by the local pilotage bye-laws, in connexion with the recruitment of licensed pilots for the pilotage service of the United Kingdom. Under this system, an apprentice, upon completion of a prescribed term of years—usually five—is eligible, subject to an examination, for the grant of a license for the pilotage district concerned.

In the sea fishing service, apprenticeship is regulated by the Merchant Shipping Acts and indentures must be made before Superintendents of Mercantile Marine Offices, who must satisfy themselves as to the suitability of the indenture, the master and the apprentice. During recent years, the apprenticeship system has been losing ground and is now almost extinct. This will be seen from the fact that, while the numbers of indentures made in the five years previous to the war averaged over 100 each year, they varied between 3 and 9 during the years 1921–25. The cause may be that a boy can earn much higher wages as a deck-hand or cook, or in unloading fish at the docks, than he can as an apprentice.

TECHNICAL AND COMMERCIAL EDUCATION.

Introductory.

Definition of Scope of Memoranda.

The object of these Memoranda is to describe the position as to technical and commercial education in England and Wales, and in Scotland, with special reference, so far as technical education is concerned, to the groups of industries selected by the Committee for special examination.* For the present purpose the jute and flax industries of Scotland have been added to the textile group. Some information regarding printing and its allied trades and pottery will be found in the Memorandum on Industrial Art (p. 336).

For the present purpose, the expression "technical" is used to describe educational provision which has immediate reference to manufacturing processes, while "commercial" relates to commerce as generally understood, and the mercantile and administrative sides of industry. The main descriptions of institutions for vocational training which are excluded from consideration by the limitation to technical and commercial education are art schools or departments (as to which see the Memorandum on Industrial Art), domestic training institutions, agricultural schools and colleges, and teachers' training establishments.

* See footnote, p. 1.

So far as institutions below the rank of Universities are concerned, the chapter refers to the "public" system of vocational education, i.e., that given in institutions which are inspected by the Education Departments of the Government and aided by Government grants either directly or through the assistance given to the local authorities which maintain or contribute to the institutions. Hence the Memoranda do not include either what are popularly called the "public schools," or (more important from a narrow vocational point of view) the various institutions conducted entirely by private enterprise for affording specialised training, i.e., business "colleges" and the like.

Source of Material.

The public system of education in England and Wales is separate from and independent of that in Scotland, and the two are administered by separate Departments, viz., the Board of Education and the Scottish Education Department. The great bulk of the material in the Memoranda has been furnished by those two Departments, and in the section on Technical Education it has been combined so as to deal with the whole of Great Britain together. As the Board of Education were not in a position to furnish information relating to universities in England and Wales, some particulars as to the technical instruction provided (mainly in relation to the engineering, chemical and iron and steel industries) in those institutions has been added to the section on Technical Education. These particulars were extracted from the pamphlet entitled "Professional Schools, Post-Graduation Courses, Specialist Studies: Universities and University Colleges of Great Britain and Ireland, Session 1925–26," published by the Universities Bureau of the British Empire, supplemented in some instances by reference to university calendars. The information on which the section on commercial education in the Universities of England and Wales is based was obtained by means of a questionnaire issued by the Committee to those Universities which have schools of commerce. A ready response was made to the Committee's request for information, and full and informative particulars were supplied.

Outline of Provision for Technical and Commercial Education in England and Wales.

It may be of assistance in considering the detailed information contained in the various detailed Memoranda to indicate here the main outlines of the public provision for technical and commercial education and its relation to the general structure of the educational system. The Annual Report of the Board of Education for 1924–25 (Cmd. 2695) includes a comprehensive "Survey of the provision made for technical and further education," in which the history of the subject is outlined, the general conditions now obtaining are described, and the results and prospects of technical education are discussed. Much of what follows is based on that survey.

The first step in the educational system is, of course, the *public elementary school*, which provides education for over 80 per cent. of the children between the ages of 5 and 14 in England and Wales. In 1924–25 there were nearly 5,600,000 children on the books of public elementary schools. Of this number 10,000 were between 15 and 16 years of age and 1,300 over 16, the majority of these being in attendance at "central schools," i.e., public elementary schools to which children are drafted, usually as the result of selection by examination, at the age of about 11, in order to be given more advanced instruction.

In the year 1924–25 the total number of leavers from Public Elementary Schools (including pupils transferred from one elementary school to another) was 714,312. Of these, 539,514 left for employment (including apprenticeship and employment at home), on becoming totally exempt from school attendance, and did not enrol for any form of full-time further education; and 88,101 passed to various types of institution for higher education, including secondary schools. (See table, p. 174.)

The *secondary school* provides a progressive course of general education for boys and girls of an age range at least as wide as from 12 to 17. Pupils commonly enter secondary schools at 11 or 12 years of age and remain until 15 or 16, the average school life, which shows a tendency to increase, being at present about $3\frac{3}{4}$ years. At any one time, about 15 per cent. of the pupils have passed the age of 16. In 1924–25 there were 415,000 pupils in the secondary schools included on the Board of Education lists (i.e., schools found efficient on inspection and—in the majority of cases—grant-aided). It is a growing practice for Local Education Authorities to test all children in elementary schools at about the age of 11 with a view to discovering their suitability for further education. Something like 11 or 12 per cent. of public elementary school pupils pass to secondary schools, and such children form about two-thirds of the 350,000 pupils of secondary schools on the Board of Education's Grant List. The total number of leavers from grant-aided secondary schools in any one year is about 75,000, of whom about 4 per cent. pass to University institutions. The number leaving other secondary schools is estimated at about 12,000 or 13,000. The total number of entrants to the Universities and University Colleges of England and Wales in 1924–25 was 9,756 (6,751 men and 3,005 women).*

How is the provision for technical and commercial education related to the system outlined above?

The arrangements are most easily described in relation to the passage of pupils from public elementary and secondary schools into full-time or part-time courses of technical or commercial education.

* This total includes only full-time (internal) students entering for first degree or first diploma courses, and does not take account of institutions (e.g. certain theological and agricultural colleges, etc.) not in receipt of a Treasury grant.

*Arrangements for Full-time Study.**

Junior Technical Schools.—Those pupils who remain in elementary schools after the age at which transfer to Secondary Schools is customary (11 or 12) have in a number of towns the opportunity of taking full-time courses of two or three years in which they can continue their general education and be prepared for entry into industrial employment at about 16. The customary age for entering such courses is 13 or 14. In 1924–25 there were recognised as Junior Technical Schools 74 schools for boys, with 10,141 pupils, and 15 schools for girls, with 1,813 pupils. In addition, there were recognised under the head of Day Technical Classes 11 junior industrial courses (full time) for boys, with 542 pupils.

Junior Commercial Schools (*Day "Technical"† Classes*).—Parallel opportunities of preparation for commercial employment are less common. In 1924–25 there were 31 Junior Commercial Schools (recognised as Day Technical Classes), with 1,549 boys and 2,314 girls in attendance.

Technical Institution Courses.—Secondary school pupils who, on leaving, desire further full-time study in preparation for entering industry at 18 or later have in some of the greater cities opportunity of obtaining it in Technical Institution Courses. These generally extend over two years or more. They must include science or technology. In 1924-25 there were 144 separate courses of this kind in 44 Technical Colleges or Schools. The number of full-time students in them was 3,048. In addition, 1,035 other students were instructed in the courses.

Senior Commercial Courses (*Day "Technical" Classes*).—Parallel opportunities of preparation for commercial life were available in 1924–25 in 16 courses attended full-time by 212 boys and men and 333 girls and women.

Arrangements for Part-time Study (*Evenings*).

Most of the authorities who encourage evening study among young persons whose full-time education ends in the elementary school make a substantial provision of evening instruction both in the premises of some ordinary day schools and in the premises which are described as Technical Schools or Commercial Schools. Schemes of graded study are organised to occupy four or five years, the first stage of two years being spent in attendance at an "Evening Continuation School," held as a rule in Elementary, or occasionally in Secondary, School premises. For boys engaged in industrial work Continuation Schools provide *Junior Technical Courses*: for boys and girls concerned with commercial work *Junior Commercial Courses* are

* See tables, pp. 177–8.

† In the official classification adopted by the Board of Education, the expression "technical" has a wider meaning than as defined on p. 160, and may include what is there defined as "commercial."

arranged. In courses of either type English is studied; other subjects commonly included are Mathematics and Technical Drawing in Junior Technical Courses, and Commercial Arithmetic and Shorthand in Junior Commercial Courses.

Students who, having completed a Junior Course, wish to proceed from that point, are generally able to find a suitable Senior Technical or Senior Commercial Course of two or three years' duration. At this stage the industrial courses are specialised to correspond with the principal local industries, and the special equipment of a Technical School is required. A *Technical School* may thus have distinct Senior Evening Courses in Engineering (and often separate courses for Mechanical and for Electrical Engineering) and one or more of the following:—Mining, Building, Textiles and Chemistry. Boys who enter industry from a Junior Technical School or a Secondary School generally pass direct into the Senior Evening Course.

Senior Commercial Courses do not require the same kind of specialisation, but in the grouping of subjects to make a course some options are generally allowed. To a considerable extent senior evening commercial courses are provided in the premises of Elementary and Secondary Schools.

Students who complete Senior Technical Courses can in some technical schools proceed to more advanced or more highly specialised study. There are also commercial courses of advanced standard, but mainly for students interested in commercial professions, and not for the general office employees for whom the senior courses are planned.

These references to courses are to be taken as implying the study of a group of subjects by attendance for at least two and normally three nights a week. But by no means all evening students have begun part-time study at the first opportunity after leaving a day school. Large numbers of evening students are over 21, and in practice the course system is not pressed upon students over 18, though they often find it advantageous to take courses and not to attend only on one night a week for one or two subjects.

Arrangements for Part-time Study (Day).

Day Continuation Schools.—One Day Continuation School (Rugby) is conducted on a compulsory basis. In London and West Ham most of the young persons who attend the Day Continuation Schools are unemployed and get some opportunity of vocational preparation in their attendance of 15 hours a week. Most of the other Day Continuation Schools receive the students for at most two half-days a week and sometimes for only one, since they are normally in employment and can only attend if permitted or required to do so. In such circumstances the instruction must be of much the same type as that given in the Junior Evening Continuation Course.

Students who pass through a Day Continuation Course of two years' duration would normally proceed, if they want further education, to Senior Evening Courses.

Day Apprentice Courses.—Employers sometimes allow young persons of 16 and over to attend for day technical instruction on one or two half-days per week.

Numbers of Schools and Students (Part-time Study).

In "*Day Technical Classes*" the numbers of part-time students in Technical and Commercial Courses in the year 1924–25 were, boys and men, 1,094 in Technical Classes and 62 in Commercial Classes: girls and women, 30 in industrial classes and 180 in Commercial Classes.

In the same year there were 72 *Day Continuation Schools* attended by 11,948 boys and by 12,114 girls.

In the same year *ordinary part-time continuation, technical and commercial instruction* was given in 4,147 schools, and was attended by 376,743 boys and men and by 304,200 girls and women. Of these schools 125, including all the greater Technical and Commercial Colleges and Schools, were classed as "large schools." These were attended by 108,884 boys and men and by 40,999 girls and women. It would not be possible, except at the cost of great elaboration of statistical work, to give the numbers who were attending for technical and for commercial instruction as distinct from other types of study, such, for example, as house craft and literary study. The statistics of the Board of Education include an analysis by subject of all the classes (not the complete courses) in ordinary continuation and part-time technical and commercial schools. Extracts from such analyses are given in Table A on page 175.

It remains to add that the institutions in which the "large" evening schools are held are, as a rule, not confined to evening work. Most of them embrace in one organisation, besides evening instruction of senior and advanced standard in a considerable range of subjects, day courses falling under one or more of the following heads:—Technical Institution Courses, Junior Technical Schools and Day "Technical" Classes (including Junior Commercial Schools and other full-time or part-time vocational instruction). The actual organisation of the institution would ordinarily treat both day and evening instruction in a group of related subjects as a Department (e.g., of Engineering, Commerce, Chemistry, Textiles, Building, as the case may be). Several of these institutions include a Women's Department and a Department of Art. The figures given above do not cover art study in an institution where, as generally happens, the Department is separately recognised by the Board as an Art School. But as this arrangement is not universal, a certain amount of art instruction, not always of a very elementary kind, goes to make up the totals of students in ordinary evening schools.

The Board's "List III," based on the work of the year 1922–23, gives some information about the more important Technical and Commercial, Art, and other Schools.

Annual Intake and Leakage.

In 1924–25, 265,243 boys aged 14 to 15 and 258,770 girls of a like age left Public Elementary Schools and did not proceed to other day schools; and in evening schools of all kinds there were 61,208 boys and 53,176 girls aged 14 to 15 on enrolment. This is the largest evening school age-group, and about 4,500 boys and 4,500 girls may be added for entrants to Day Continuation Schools, making, approximately, 66,000 boys and 58,000 girls who enter upon part-time education. Thus, about 25 per cent. of the boys and 22 per cent. of the girls begin part-time education. Such figures are for the whole of England and Wales. An examination of the conditions in a Yorkshire County Borough where the standard of organisation is high showed that about one-third of the leavers went as soon as possible to the Evening Schools, the enrolments being distributed over the junior technical, commercial and domestic courses. A following up of these students disclosed that 40 per cent. of those who enrolled in the technical course did not go beyond the first year of the two-years' course, and that of the residue who entered the second year 44 per cent. went no further. For the commercial course the corresponding percentages were 30 and 45.

Hours of Attendance.—Evening Schools, whether Continuation, Commercial or Technical, seldom meet for more than 30 weeks of instruction in a year. A course arranged to occupy two hours a night on three nights for 25 weeks would allow a student to receive 150 hours of instruction in a year; but even in the best organised county boroughs, taking Continuation, Technical and Commercial Evening Schools as a whole, the average hours per student enrolled seldom exceed 100, and a figure between 80 and 90 is customary. An average taken for boys only would be higher. Since the great majority of the students attend after a full day's work, no very high standard of regularity is to be expected; but, quite apart from the more general value of the discipline of continued education, it is certain that the opportunities enable young persons of ability to make real progress and to acquire very considerable attainments, especially in the more concrete studies.

Teachers.

About 3,000 teachers give their whole time to teaching in Technical, Commercial and Art Schools. Among them are graduates in Science, Engineering and Commerce, members of professional bodies such as the Royal Institution of British Architects and the various institutions of Engineers, Associates of the Royal College of Art or other persons having an Art Teacher's qualification, besides many who are

without academic or similar qualifications but possess extensive knowledge of particular branches of manufacture, handicrafts, etc. In addition to these full-time teachers there are many thousands of persons who engage in continuation, technical, commercial and art education in the evening only. Some of these are teachers in Elementary or Secondary Schools, but the greater number are occupied during the day otherwise than in teaching. Except as regards art teachers, there is in this country no system of training for the kinds of educational work now in question at all comparable with the arrangements for training intending teachers in Elementary and Secondary Schools. The Board of Education have, however, for some years past organised short full-time courses for special groups of teachers, e.g., Engineering, Building, Commerce, Mining, Dressmaking, etc. Some part-time courses have also been organised for the benefit of teachers who could not conveniently attend full-time courses, such, for example, as the teachers engaged in teaching boot and shoe processes. By means of these short full-time and part-time courses the Board endeavour, according to the particular conditions, to raise the standard either of skill in teaching, or of knowledge of the subject taught.

Examinations.

The schools are visited by His Majesty's Inspectors, who consider the aims, methods and standards of the teaching and any other matters which affect the efficiency of the schools, such as the suitability of the premises and the adequacy of the equipment. But they do not ascertain the attainments of the students. Examination, which has always been and still is a very important agency in Technical and Commercial education, particularly for part-time students, is in the hands of several bodies, some of which have only slender connections with the schools, while others are in intimate relations with the teachers and with the Local Education Authorities.

The City and Guilds of London Institute has examination syllabuses for over 80 subjects, including manufacturing, constructive and extractive industries and industrial, artistic and domestic handicrafts. In 1926 the Institute examined in Great Britain in 81 subjects: the examinations held in 332 centres were attended by 11,241 candidates. In commerce the Royal Society of Arts is the principal examining body. It issues 29 syllabuses and in 1926 examined 86,246 exercises. The London Chamber of Commerce also conducts commercial examinations.

Sometimes, as in the West Riding and in Kent, the Local Education Authority maintains a system of examinations for its own schools. But there are examples of joint action by Authorities for this purpose, viz., the Union of Lancashire and Cheshire Institutes, the Union of Educational Institutes (Midland Counties Union), the East Midlands Educational Union and the Northern Counties

Technical Examinations Board. They are not all following an identical plan, but in principle the policy of associating the teachers with at least the preparation of syllabuses is accepted. In 1924 the Union of Lancashire and Cheshire Institutes examined candidates from 380 schools. These schools were attended by 42,740 students in Preliminary (i.e., Junior) Technical, Commercial, Domestic, etc., courses; by 22,335 students in Senior (first and second year) Technical, Commercial and Domestic Courses; by 6,852 students in Advanced Courses, and by 33,808 students taking single subjects in Science, Technology, Commerce, etc. The numbers of candidates in grouped courses were 12,525 Preliminary, 14,104 Senior, and 222 Advanced, and in single subjects 5,427 were examined—a total number of 32,278 candidates.

Such figures illustrate the large scale on which some examinations are conducted. The Board of Education at one time held general examinations. These have been abandoned, but in order to promote a high standard of well-organised evening study and to give able and diligent students an opportunity of obtaining a valuable certificate the Board have entered into arrangements for the issue of National Certificates jointly with professional bodies of very high standing, viz., the Institution of Mechanical Engineers, the Institute of Chemistry, the Institution of Electrical Engineers, and the Institution of Naval Architects in association with the Worshipful Company of Shipwrights. Neither the Board nor the Institution examines the students; the settling of questions and the marking of answers are undertaken by the teachers, subject to assessment on both points by assessors appointed by the professional body. In exceptional cases the examining is done, subject to assessment, by the local examining Union. The numbers of part-time candidates under these arrangements in 1925 were:—Mechanical Engineering, ordinary, 1,083, higher, 302; Electrical Engineering, ordinary, 387, higher, 117; Chemistry, ordinary, 87, higher, 59. No examinations have yet been held under the Naval Architecture Scheme. These figures relate only to the assessed examination of students in the final stages of courses extending over two or three years. A somewhat similar arrangement is made in co-operation with the Institution of Gas Engineers. Such co-operative arrangements have been fruitful both in promoting a high standard of efficiency and in setting an attractive mark before the abler part-time students.

As in other branches of education, examination is a very controversial topic, and there is now general support for the view that a thorough investigation of technical and commercial examinations is required.

In the sections of this chapter separately devoted to Technical and to Commercial education more detail is given about the intrinsic character of the studies followed in the more important of the

subjects taught. In the section on Technical Education some information is given about the relation between the schools and the several industries in relation to which they offer instruction.

On the general question of the efficiency of the arrangements it may be said that there is commendable zeal in most cases on the part of both students and teachers; the reports of His Majesty's Inspectors, while naturally critical in matters where improvement might reasonably be expected, contain abundant evidence to show that much praiseworthy and not a little excellent work is being done. In some subjects there is definite evidence of progress in recent years, and particularly in subjects which come under the National Certificates Schemes.

Financial Arrangements.

State-aided Continuation, Technical, Commercial and Art Education is for the most part directly maintained by the Local Education Authority for higher education: to some extent it is maintained by other bodies and firms in financial dependence on that Authority and under its direction, a notable example being that of the London Polytechnics. There are very few schools for which other bodies bear ultimate financial responsibility. Schools maintained for private profit are not grant-aided.

The basis of State aid has progressively broadened from a very narrow system of payment on examination results, through a broader system of payments measured at more or less determinate rates upon the volume of work, to the present system of aiding Local Education Authorities in respect of the net expenditure they incur in the exercise of their power to supply, or aid the supply of, every kind of education except that for which other State aid is given, such as University education.

In the financial year 1924–25 the situation in respect of Continuation, Technical, Commercial, Art and other kinds of Further Education (e.g., Adult Education) was as follows:—

Spent by Local Education Authorities		
in maintaining their own schools ..	£3,002,610	
on schools maintained by other authorities	171,531	
on schools maintained by other bodies or persons (mainly on the London Polytechnics)	439,102	
		3,613,243
Received		
Fees	331,417	
Sales	47,492	
From other Authorities	108,354	
		487,263
Net expenditure		£3,125,980

The State aid in respect of this expenditure may be put at approximately 50 per cent. of it, say £1,550,000. Loan charges on buildings for this branch of education amount to £125,000, of which 50 per cent. is paid by the Board of Education.

The overhead charges for the administration and inspection of all forms of higher education are about £700,000, out of a total net expenditure of about £12,500,000; and a complete estimate of the State aid to further education (as defined above) under Local Education Authorities would include some portion of the 50 per cent. payable in respect of these administrative expenses.

In direct grants to other bodies and persons in respect of further education the Board paid in the same financial year £32,220 to Technical Colleges, etc., £5,589 to Art Schools, £9,712 to Junior Technical Schools, £11,380 to residential schools of Nautical Training, £21,598 to Adult Education Classes and Schools under Universities and such bodies as the Workers' Educational Association, and £3,876 to Day and Evening Continuation Schools.

It is impossible to divide these grants, or the grant attributable to the expenditure of £3,125,980 by Local Education Authorities, to show separately the State aid to Continuation, Technical, Commercial and Art Education respectively.

Charges to Students.—At schools directly maintained by Local Education Authorities at a cost of £3,002,610, of which £47,492 was recovered by sales, the students paid fees amounting to £331,417. Thus on the average they meet about 11 per cent. of the full cost. It is impossible to make any general statements as to the actual charges which are customary. Fees vary according to the standard and type of a course if it is full time, and the number of evenings of attendance if it is part time: there are variations according to age, and still more important are the differentiations according to residence. The whole system is overlaid by liberal provisions for exemptions on such grounds as enrolment at the first opportunity after leaving school, and excellence of attendance during the preceding session.

The following are illustrative items out of the fee arrangements for the Technical, etc., Schools under the control of the London County Council. Exemptions from fees are available only for students who live in London, but the fees charged to students who live in Kent and Middlesex are the same as the fees chargeable to London students. Other external students pay the full cost, unless they work in London, when they pay half full cost. For a senior full time course the fee ranges from £12 p.a. to £45 p.a., but is normally under £18 p.a., the full cost fee being £60 p.a. For a junior full-time course (junior technical school) the fee is normally £3 p.a., the full cost fee being £48 p.a. In a Polytechnic Evening Course the fee is £1 per session for one evening a week, or 30*s.* for a grouped course, half fees being charged to students under 18, or to students under 21

who are learning a trade, the full cost fee per evening per week being £4 per session in technology and art, or £3 5*s.* per session in commerce.

In a junior evening institute the normal fee is 3*s.* per session for a grouped course of three nights a week, the full cost fee for each hour per week being 17*s.* 6*d.* per session for the Commercial Course and £1 2*s.* per session for the Technical Course.

Outline of Provision for Technical and Commercial Education in Scotland.

In Scotland the first step in the educational system is the primary school, or the primary department of the secondary school, which provides education for practically all of the children between the ages of 5 and 14. The pupil who at about the age of 12 has reached a given standard of attainment has three courses before him. He may contemplate leaving school at 14, or may be prepared to remain at school for three years in order to complete a definite three years' course, or for five or six years in order to complete a full secondary course. In either of the first two cases he may take his course in the advanced division of his home primary school or else in a neighbouring school providing advanced division courses. In the third case he may proceed at once to a secondary school, which is a school providing at least a five years' course of suitable education leading to the leaving certificate of the Scottish Education Department.

In the year 1924–25 the average number of scholars on the registers of primary schools (of whom less than 2,000 were over 15) was 653,267 ; of these 583,297 were below advanced division, and 69,970 in advanced divisions. In the same year the average number of scholars on the registers of schools conducted under the Secondary Schools Regulations was 150,679, of whom 74,526 were in primary departments and 76,153 in secondary departments. The total average number of scholars on the registers of primary and secondary schools was thus 803,946. The total number of pupils who left primary schools or primary departments of secondary schools in 1924–25 was 108,899, of whom 32,285 passed to secondary departments. The number of leavers from secondary departments, including advanced divisions, in the year 1924–25 was 29,300. Of these the great majority left at the end of the first, second and third years of the course.

The most important part of the provision for further education in Scotland is the continuation class, held as a rule in the evening Under the new Code of Regulations operative from the beginning of

the Session 1926–27 changes in organisation have been made, but the statistical material available for the present survey is based on the continuation class organisation previously existing, which is described in the section on the history of technical education in Scotland on pages 181–3. The instruction falls into four divisions, of which Divisions II and III are the most important from the point of view of this memorandum, Division I consisting of classes for the completion of elementary education, and Division IV of classes of a recreational type. During the session 1924–25 the total number of students in attendance at continuation classes was 142,538, of whom 24,338 were under 15, 55,157 between 15 and 18, and 63,043 over 18. The total number in attendance in 1912–13 was 143,942. The comparative figures for Divisions II and III are as follows :—

Division II—Classes.	1912–13.	1924–25.
English and English subjects	16,538	9,045
Commercial subjects	42,346	23,698
Art subjects	3,611	2,084
Modern languages	3,037	2,091
Technological subjects	20,240	16,107
Agriculture and forestry	236	244
Navigation and allied subjects	1,069	1,062
Domestic subjects	53,461	44,536
Not coming under previous classifications	8,641	8,303
Division III—Courses.		
Art and art crafts	1,634	1,445
Commercial	11,200	23,915
Domestic	2,225	10,547
Languages	848	716
Engineering	9,295	9,797
Mining	2,778	2,538
Building	1,793	4,446
Navigation	44	88
Other technological courses	4,478	7,442
Other courses (not under preceding classifications)	121	742
	34,416	61,676

It must be explained that the figures for Division II do not represent the number of *individuals* in each group; they are the sum of the

numbers of students attending the various classes comprised in each group, irrespective of whether some students may have attended two or more classes. The total number of individuals attending classes under Division II was 80,431 in 1912-3 and 67,541 in 1924-5.

Under the new organisation operative from 1926, Sections ii and iii correspond with the old Divisions II and III, with the exception that under the new Section iii a course has a minimum of four years' duration, whereas under the old Division III only three years were required. Thus, a certain amount of work which formerly came under Division III has been relegated to the new Section ii.

A continuous course of instruction is aimed at, extending usually over four or five years and occupying six hours per week for a session of twenty-four or twenty-five weeks*. For those who leave school without reaching a sufficiently high standard of elementary education to enable them to take up the first year's work of a technical course with profit, preparatory courses of one or two years' duration are available. Students are encouraged, on the successful completion of their continuation class courses, to proceed for further study to the day or evening classes in central institutions. Central institutions are centres of advanced specialised instruction (e.g., technical college, college of agriculture, commercial college, etc.). There are sixteen, of which eleven are largely supported by grants under the Education Department administration, the remainder being agricultural and veterinary colleges. Of the eleven central institutions under the Scottish Education Department, four are concerned entirely with art and domestic science. Of the remainder, one is a commercial college, one a nautical college, and the rest are technical colleges. Two of the latter, however, have art departments, and one of these has also a School of Domestic Science. The total numbers of day and evening students in the eleven central institutions in the session 1924–25 were 6,688 and 12,745 respectively. Of these, about 1,800 and 9,000 were in technical colleges ; 143 and 1,807 were in the Glasgow and West of Scotland Commercial College, and 286 and 75 were in the Leith Nautical College.

In the technical colleges, advanced technical instruction, comprehensive in scope and character, is fully organised ; and education authorities are also quite ready to provide whatever advanced instruction is desirable in the industrial centres within their own areas.

Full-time technical education in Scotland is provided mainly in the universities and the technical central institutions. In the universities practically all the technical students, and in the larger central institutions a considerable proportion of them, have come from secondary schools at about 18 years of age.

* The average attendance is between 60 and 70 hours in the year.

Statistics.

Leavers from Public Elementary Schools during 1924–25.

England and Wales.

—	Boys.						Girls.	Total Boys and Girls.
	Under 12.	12 and under 13.	13 and under 14.	14 and under 15.	15 and over.	Total.	Total.	
In order to attend Secondary Schools.	19,086	9,999	3,071	752	90	32,998	27,097	60,095
In order to attend Junior Technical or Commercial Schools.	—	1,180	2,750	996	65	4,991	2,925	7,916
In order to attend other Full-time Institutions, or Day Schools not Public Elementary Schools.	5,497	1,636	1,690	1,223	142	10,188	9,902	20,090
For employment, including apprenticeship and employment at home, on becoming totally exempt from school attendance.	—	4	506	265,243	8,036	273,789	265,725	539,514
For other reasons ..	29,386	5,806	5,404	1,596	170	42,362	44,335	86,697
Total	53,969	18,625	13,421	269,810	8,503	364,328	349,984	714,312

As regards Scotland, similar particulars are not available, but the total number of pupils who left primary schools (or departments) during the year 1924–25 (excluding those transferred from one primary school to another) was 108,899. Of these, 32,285 were transferred to secondary schools or departments, and 13,978 who left school without being exempted were for various reasons (emigration, death, etc.) not enrolled in other schools or were untraced. The foregoing figures cannot be divided as between boys and girls, but out of the total average attendance of 582,779 at primary schools, 295,396 were boys and 287,383 were girls.

*Technical and Commercial Instruction in England and Wales.**

In the following tables an attempt is made to exhibit the state of Continuation, Technical and Commercial Education in 1924–25 in comparison with the year 1912–13. Explanatory notes are supplied when necessary. The figures are derived from "Statistics of Public Education in England and Wales, Part I, 1912–13" (Cmd. 7674 of 1914) and from "Statistics of Public Education for the year 1924–25" issued in 1926.

* For statistics relating to Scotland, see pages 171–3 and 250–1.

A. PART-TIME (MAINLY EVENING INSTRUCTION; AND DAY CONTINUATION SCHOOLS).

*Number of Schools and Students.**

Note.—The available data do not enable the statistics as to numbers of schools and students to be distributed in relation to the subjects studied. The statistics, therefore, include schools offering and students taking instruction in subjects other than those of a technical or commercial character.

	1912–13.		1924–25.	
Number of Schools ..	6,876		4,185	
Number of Students.	*Boys and Men.*	*Girls and Women.*	*Boys and Men.*	*Girls and Women.*
Under 16	162,001	97,112	129,102	105,360
16 and under 18 ..	94,060	49,261	92,695	56,157
18 and under 21 ..	77,391	45,574	72,214	40,589
21 and over	133,788	139,694	94,680	114,208
	467,240	331,641	388,691	316,314

In 1924–25 there were 72 Day Continuation Schools attended by 11,948 boys and 12,114 girls. These are included in the above total numbers of students.

Number of Classes in Certain Subjects.

(i) *Languages.*

	1912–13.	1924–25.
English	11,659	10,911
French	2,397	2,359
German	857	376
Italian	56	169
Spanish	269	357

(ii) *Technical, etc.*

Mathematics	10,785	14,700
General Science	1,182	1,814
Chemistry	1,526	1,276
Physics	1,916	1,599
Geology	204	119
Biology	705	313
Manual Instruction, Wood	2,377	1,615
,, ,, Metal	379	251
Engineering (all)	3,081	3,884
Electrical	785	1,398

* *See* note 3 on next page.

	1912–13.	1924–25.
Building Construction, Architecture, and Surveying	1,056	1,269
Plumbing and Gas Fitting	448	542
Carpentry and Joinery	356	428
Mining (Coal)	1,224	1,207
Metal Mining and Metallurgy	206	196
Iron and Steel Manufacture	34	42
Gas Engineering	67	80
Dyeing	76	62
Cotton Spinning and Weaving	419	591
Wool and Worsted Spinning and Weaving	358	263
Tailoring (Men and Women)	76	344
Boot and Shoe Manufacture	137	274
Printing	176	182

(iii) *Commercial and Professional.*

Shorthand	6,645	5,958
Bookkeeping and Accounting	4,033	4,707
Typewriting	1,378	1,685
Geography	1,089	1,248
Commercial Correspondence	1,836	1,355
Business	1,270	—
Business Economics (Theory and Practice of Commerce)	—	1,272
Commodities	—	117
Law and Commercial Law	151	496
Banking and Currency	100	155

Notes.—1. Commercial students study subjects other than those given in (iii) above, just as industrial students take subjects like English and mathematics; and as classes in such subjects are not normally distinguished for statistical records according to the type of student in attendance, no useful figures of the number of students can be given.

2. Changes in classification make exact comparisons difficult; but in the main it would appear that the facilities offered are larger in the more advanced subjects and rather smaller in the others. But the figures for classes in 1924–25 do not include the classes in Day Continuation Schools.

3. The differences in the numbers of students as between 1912–13 and 1924–25 are partly accounted for by certain general changes in circumstances, such as :—

(i) The development of Secondary or of Central Elementary Schools and the raising of the school leaving age.
(ii) The great reduction in the numbers of rural evening schools.
(iii) The inclusion in the figures for 1912–13 of students in Adult Education classes under University Joint Committees and the Workers' Educational Association. Such students are now separately accounted for. Their numbers in 1924–25 were about 12,500 men and about 9,500 women.

B. POST SECONDARY FULL-TIME COURSES IN TECHNICAL COLLEGES ("TECHNICAL INSTITUTION COURSES, ETC.")

	1912-13.	1924-25.
Number of Institutions having such courses	27	44
Number of Full-time Students—		
In all courses	1,199	3,048
In Architecture and Building	73	422
In Boot and Shoe Manufacture	4	21
In Carriage and Motor Body Building	14	31
In Chemistry and Applied Chemistry	101	274
In Engineering (all varieties)	584	1,110
In General Science	89	231
In Leather Manufacture	28	36
In Mining	110	162
In Printing	—	8
In Technical Optics	7	16
In Textiles	57	161
Students attending part only of a course or for part only of a year		
In all courses	104	1,035
In Architecture and Building	1	19
In Boot and Shoe Manufacture	—	37
In Chemistry and Applied Chemistry	17	122
In Engineering (all varieties)	35	297
In General Science	11	213
In Leather Manufacture	2	14
In Mining	4	3
In Printing	—	31
In Technical Optics	—	7
In Textiles	23	202

C. OTHER DAY COURSES.

("*Day Technical Classes*" *in* 1912–13 *and* "*Day Technical Classes*," "*Junior Technical Schools*" *and* "*Schools of Nautical Training*" (*Residential*) *in* 1924–25).

	1912–13.		1924–25.	
	B.	G.	B.	G.
Students : Full-time	5,118	3,142	16,884	5,869
,, Part-time	1,725	2,071	1,563	2,128

Junior Full-time Courses (*i.e., students under* 15 *on admission for year*)—

Industrial Courses	66		85*	15†
Students	2,981	1,196	10,683	1,813
Commercial Courses	5		31	
Students	497	273	1,549	2,314
Nautical Courses (Residential)	5		—	6
Students	1,131	—	1,576	—

* Of these 74 with 10,141 pupils are "Junior Technical School" courses.
† All are "Junior Technical School" courses.

C. *Other Day Courses*—contd.

	1912–13.		1924–25.	
	B.	G.	B.	G.
Senior Full-time Courses (i.e., students 15 or over on admission for year).				
Industrial Courses	6		16	
Students	71	1	275	5
Commercial Courses ..	—	—	16	
Students ..	—	—	212	333
Pharmacy Courses	—		14	
Students ..	—	—	154	82

Notes.—1. Of the 74 "Junior Technical School" courses for boys which in 1924–25 were attended by 10,141 pupils, 68 attended by 9,692 pupils prepared the boys in a course of two years, or sometimes three years, for constructive trades, including Engineering, Building or Woodwork. No other type of Junior Technical School accounted for the attendance of as many as 100 boys in the school, or schools of the type.

2. Classes for part-time day instruction of apprentices were not as a rule treated as "Day Technical Classes" and separate statistics for them are not available.

I.—GENERAL NOTE ON TECHNICAL EDUCATION.

(*From material furnished by the Board of Education and the Scottish Education Department.*)

(i) Historical.

(*a*) *England and Wales.*—Modern technical education began in England by the setting up of the first "Mechanics' Institute" in London in 1824. Very rapidly similar institutes were established in other parts of the country until by the year 1860 their number was about 750, of which 300, with about 20,000 students, were in Lancashire and Yorkshire. The general object of these institutions was to teach to artisans the principles underlying their trade, and accordingly they provided evening classes in science, drawing, languages and commercial subjects; very often it was found necessary to give instruction in reading, writing and arithmetic as well.

Until 1879, the main income of the mechanics' institutes and "science and art school." was derived from grants made by the Science and Art Department on account of the successes of students

in examinations conducted annually by the Department. Further, most of the teachers available for work in the schools were those whose qualifications were gained by passing advanced stages of the examinations of the Department. These two circumstances combined to limit for a number of years the curriculum of the schools to the subjects included in the "Science and Art Directory," that is pure science, mathematics, machine construction, building construction, applied mechanics, naval architecture, metallurgy and mining.

In 1879, the City and Guilds of London Institute, by agreement with the Science and Art Department, undertook to encourage local classes throughout the country in technological subjects, to prepare syllabuses of instruction and to hold examinations: from the funds placed at its disposal by the City Companies, the institute was able to offer to teachers payments on the results of the examinations in the same manner as the Science and Art Department did for their examinations. This financial arrangement lasted until 1891; by this time, the Technical Instruction Act had given to County Councils and to County Borough Councils powers to aid technical instruction, and the Local Taxation (Customs and Excise) Act had provided these bodies with funds for the purpose.

By the end of the nineteenth century the influence and support of the Science and Art Department and of the City Companies—working through the City and Guilds of London Institute—had led to a considerable development of the instruction in evening classes of artisan students.

It was not, however, until after the Education Act of 1902 had come fully into operation that the "science and art school" became a real "technical school," providing instruction in a very wide range of subjects related to the educational needs of youths and men engaged in the most varied occupations.

The widening of the curriculum of the technical school after 1902 was accompanied by two changes of great importance.

In the first place, considerable attention was devoted to ensuring that the technical school should be able to rely on receiving each year a steady supply of students properly equipped to benefit by the instruction provided. To this end the whole system of "continuation" schools was reformed so as to give a boy, during the period between his leaving the elementary school at 13 or 14, and joining the technical school at about 16, an ability to draw, some knowledge of the methods of calculation appropriate to technology, an acquaintance with the "science of common life" and an increased power of expressing his ideas orally and in writing. Necessarily this development occupied some time, but there is now in practically every urban industrial area an adequate supply of evening continuation schools upon which the responsibility rests for bridging the gap between the elementary school and the technical school.

In the second place, it had been usual for most students to attend science and art schools for only one or two nights a week during the winter months, taking those subjects which appeared to them likely to be of value. During the last twenty years it has become customary for students in technical schools to attend for about six months in the year a " grouped course " of related subjects, and it is found that a certain proportion of them will do this for a period of three or four years. As is to be expected, there is invariably a considerable leakage of students at the end of each year; nevertheless, the number who persist in their attendance for a series of years is, in the aggregate, considerable.

During last century practically the whole of the technical education provided in schools—as distinct from Universities or University Colleges—was given in the evening by teachers who, for the most part, were engaged during the day in some other occupation. Gradually, and to a limited extent only, arrangements have been made in the schools in the larger centres of population for technical instruction to be given during the day, sometimes to full-time students, sometimes to students released from work for the purpose. It is still the case, however, that by far the greater part of the work of the technical schools is done during the evenings from September to April.

In England and Wales connections between the technical schools and the Universities are accidental rather than systematic. The Universities have aimed, in the main, at making comprehensive internal provision for full-time students who are candidates for University degrees and diplomas, and some of them make extensive provision at their own cost for various branches of applied science. Part-time technical students, as a class, are only to a very limited extent within the purview of the Universities. This statement applies even at Manchester, where the Municipal College of Technology, and at Bristol, where the Merchant Venturers Technical College, by arrangement with the local University provides a Faculty for the University. Full-time students in these institutions can prepare for degrees and diplomas, but their part-time students are not regarded as students of the University. At Sheffield the University Department of Applied Science supplies technical instruction to evening students. At Leeds, instruction for part-time students in certain branches of technology is supplied by the University, but in other branches by the Municipal Technical School. Outside the University towns there are important technical schools, some with substantial developments of post-matriculation full-time study. None of these have yet made mutually satisfactory arrangements with the University which serves the area. To a large extent the London University examinations for external candidates meet the requirements of technical school students of pure science, engineering and economics. But students of textiles have as yet no opportunity for securing a full University recognition of their

attainments unless they become internal students of the University of Leeds or the University of Manchester. It is, of course, not intended by this statement to suggest that any public interest would be either advanced or prejudiced by more closely developed relations between technical schools and Universities.

(*b*) *Scotland.*—Modern technical education in Scotland may be said to have had its origin in the founding of Anderson's University in Glasgow towards the close of the eighteenth century. The first professor, Dr. Garnett, was succeeded by Dr. George Birkbeck, who formed a class for the gratuitous instruction of the operatives of Glasgow in mechanical and chemical philosophy. In 1823 this class detached itself from Anderson's University and adopted the title of the "Mechanics' Institution." This was the first institution of its kind in Britain, and it set an example which was afterwards followed in all parts of the United Kingdom. After various changes of organisation and title it was re-amalgamated with the Andersonian Institution and Atkinson's Foundation, to form what is now called the "Royal Technical College, Glasgow," which is affiliated to the University of Glasgow and in receipt of grants from the University Grants Committee.

Up till 1897, when the administration of science and art grants in Scotland was transferred to the Scottish Education Department, technical continuation class instruction was conducted under the Science and Art Department, and science and art classes in Scotland, as in the rest of Great Britain, were all carried on in accordance with the regulations set forth in the "Science and Art Directory." The evening continuation schools under the Scottish Education Department were concerned mainly with remedying the defects of a neglected or incomplete elementary education, and gave little heed to technical work. Although the subjects and syllabus of the Science and Art Directory were well selected and arranged, and fairly covered the field at the time, there was no effective correlation between them, and students were free to take them up in any sequence. In 1893 the first "Scotch Code of Regulations for Evening Continuation Schools" appeared, and, by subsequent modifications in the organisation of the evening schools under the Code, the day school instruction in science and art subjects, which had previously been given somewhat sporadically to special groups of pupils, was consolidated, and a complete and homogeneous system of continuation class instruction, devised to suit the requirements of every type of student, was substituted for the groups of unrelated classes. The combined effect of these changes was to revolutionise the system of technical and continuation class education in Scotland. Instruction was grouped under four separate heads or divisions according to its nature and duration. Division II comprehended classes, as distinguished from courses, for elementary instruction in special subjects, such as might be of use to pupils preparing for, or engaged

in, any particular trade, occupation, or profession, and was specially applicable to those who desired to study a single subject rather than a group, or could devote only one, or at most two evenings per week, to continuation class study. Division III, which was the most important division of the new continuation class system, provided for organised courses of systematic instruction, extending over three years or longer, and arranged with a view to fitting students for the intelligent practice of particular crafts, industries, or occupations.

But the standard of instruction at its higher stages had still to be brought up to the University level, and, to secure this end, Section 87 of the Code of 1901 constituted the technical colleges and schools of art in Edinburgh, Glasgow, Dundee, and Aberdeen and certain other colleges as special institutions (now termed " Central Institutions "), and relieved them of their more elementary teaching. At the same time the new institutions received subsidies which enabled them to devote their energies to the highest possible development of individual study and research.

Some of these central institutions in their higher reaches are of University rank, and function as Technical Universities ; they constitute the crown of the whole continuation class system, just as the older Universities form the crown of the day school system. The Heriot-Watt College, Edinburgh, the Royal Technical College, Glasgow, and Robert Gordon's Technical College, Aberdeen, are closely associated with the corresponding Universities, and co-operate with them in the provision of degree courses. Their own day-course diplomas are on a level approaching that of a University degree. In most of the districts the general continuation class system is closely linked up with the central institutions, sometimes directly, and sometimes through the larger county continuation class centres, so that the path for the deserving student from the lowest to the very highest stages is made as easy as possible. Subjects and courses are carefully correlated, and bursaries are available to provide financial aid where necessary.

An important advance in the history of continuation classes in Scotland was marked by the Education (Scotland) Act, 1908. Section 10 provides that " It shall be the duty of a School Board to make suitable provision of continuation classes for the further instruction of young persons above the age of 14 years with reference to the crafts and industries practised in the district . . . ." This Act resulted in a very large increase in continuation classes.

The issue in 1923 of the Code of Regulations for Day Schools in Scotland and the Secondary Schools (Scotland) Regulations introduced a number of important changes in the organisation of day schools which necessitated modification of the continuation class arrangements if the two systems were to fit properly into one another. When the Code of Regulations for Continuation Classes in Scotland, 1926, was being drafted, opportunity was taken to introduce some

new features with a view to strengthening the tie between day school and continuation class education, and to adapting the latter to certain changes of industrial conditions and educational requirements which have arisen since the war.

Section (iii) is the most serious and important section of the continuation class organization, just as Division III was. It provides for organized courses of four or more years' duration in any subjects or related groups of subjects which the Education Authorities, with the Department's approval, may consider appropriate to the needs of the locality. Wherever practicable the courses are expected to be affiliated to the appropriate Central Institution, so that here again there is a continuous path from the most elementary continuation classes to the technical colleges.

The new Code is really a simplification of its predecessor with a somewhat extended outlook and greater flexibility. It should enable the various education authorities and governors of central institutions who are called upon to administer it, to meet all the needs of a modern continuation class education, from the very earliest stages up to the latest. At every stage there should be the closest possible collaboration with the various interests, crafts and professions concerned, if the work is to attain the maximum of reality and fruitfulness.

* (ii) The Scientific Tendency in Technical Schools.

The majority of the technical schools supervised by the Board of Education are directly conducted by the local Education Authorities, and almost all the others are under governing bodies created to conduct educational activities. Few of the schools are exclusively concerned with only one branch of technology, and the principal teacher of a technical school having a wide range of work is almost invariably a person of academic qualifications, even though he may also have some industrial experience. In such circumstances most technical schools, deliberately or otherwise, conceive the demand of the students for technical instruction as an opportunity for educating them, the most obvious method of doing so being to emphasize the importance of the scientific treatment of the technology of the several industries in relation to which instruction is offered, and, where conditions permit, to introduce into the courses of instruction the related branches of pure or applied science. Such tendencies go furthest in connexion with those branches of industry in which scientific knowledge is most directly applied, and they operate more effectively because the actual teaching in those cases is largely in the hands of University graduates in pure or applied science. They operate less certainly in connexion with such

* This and the following section apply to England and Wales, and in a large measure to Scotland as well.

subjects as textiles, building, and boot and shoe manufacture. In none of these is the reference of the ordinary routine of work to well ascertained scientific principles so definite as it is for example in engineering or metallurgy, and the actual teachers are often men whose industrial experience has been supplemented at best by attendance at evening classes. The teaching of such men is seldom highly developed on the scientific side, though, as their knowledge of workshop practice is as a rule detailed and exact, the instruction they give is, within its own limits, by no means unsatisfactory. But the gradual introduction of a more scientific treatment of the technology of these occupations may be expected, particularly in view of the increasing attention which is being given to research into their problems.

(iii) Character of the Instruction.

A technical school course for a group of students employed in an industry (which would be given either in the evening or during working hours so far as the students were released to attend school for the purpose) will always include one or more of the following :—

(*a*) Craft training in the actual operations performed by the students, or in other work done within the same industry, for the purpose of perfecting the individual skill of the students, or to render them more available for transference from one operation to another within the industry, or to give them a general outlook over the operations of the industry taken as a whole ;

(*b*) Instruction about the methods and routine of the industry, the qualities of the materials used, the construction and functions of the several appliances and the purpose and effects of the several processes through which material passes in the course of manufacture ;

(*c*) Instruction in the uses of drawing in connection with the industry e.g., the making or reading of working drawings, the design of structures, &c ;

(*d*) Instruction, including experimental work in laboratories, in mathematics and the exact sciences (mechanics, physics and chemistry), which find application in the industry ;

(*e*) Instruction in such matters as book-keeping, costing, estimating and other topics belonging to business organization, whether as regards individual undertakings, or the industry considered collectively.

It is evident that a staff of teachers, text-books, classrooms, workshops fitted with machines arranged for production or for demonstration, supplies of materials, laboratories for experimental work in science, and drawing offices, would be essential for the carrying out of any scheme which attempted to cover the whole of the ground indicated above. The cost might be disproportionate to

the value of the results and would in any case be high, and in practice no scheme of technical instruction attempts anything like an ideally comprehensive course. Yet in one subject or another it is possible to find in the technical schools an example of each of these kinds of instruction, and it is therefore not easy to describe in generalised terms the actual character of present-day courses. What is actually done varies from industry to industry, and for each particular industry the scheme normally current to-day depends not only upon the intrinsic character of the industry and on the degree of its dependence upon the application of exact science, but also upon tradition, the antecedents of the teachers, the financial resources of school authorities, the limitations of the time which the students can give to school attendance, the attainments and wishes of students, whose attendance is in general voluntary, and (in a few cases) the declared attitude of employers and workpeople.

The variety of the methods followed can be illustrated by reference on the one hand to engineering, where mathematics, drawing and science constitute the standard curriculum, and where laboratories and drawing offices (though not as a rule workshops) are commonly used by the students, and, on the other hand, to boot and shoe manufacture, the provision for which in the principal seat of the industry contemplates considerable use of machines located in the school for actual production.

In general, however, it may be said that training in manipulative skill and the business aspects of industry are not commonly included in evening technical school courses. As regards teaching manipulative skill, school authorities either deliberately adopt the view that it is normally not the function of a technical school to perfect personal craftsmanship,* or for other reasons (e.g., cost, difficulties of disposing of output, etc.) do not provide the actual instruments of production, except for laboratory purposes, e.g., the explanation and demonstration of their construction and mode of operation. The business side of industry enters into technical school courses only where there is special justification for it, e.g., in courses for students belonging to the building industry, the subject of builders' quantities and estimates is occasionally taught to the students, of whom a fair proportion may expect ultimately to be employers.

(iv) Suggestions as to possible Improvements.

England and Wales.

(Suggestions by the Board of Education.)

There are certain general directions in which improvement might be sought.

(*a*) *Industrial Advice and Co-operation.*—Some form of relationship with industry is generally to be found wherever there are successful

* Where a high degree of individual skill with hand tools is important (e.g., plumbing), or where workers have to be highly skilled in the individual carrying through of processes (e.g., photo engraving), more attention is naturally given to manipulative work.

technical schools, and in certain towns it has been found of considerable advantage to enlist the help of Industrial Advisory Committees for one or more sections of technical education. The arrangements are sometimes informal and reflect on the one side the desire of the principal and the school staff to be in contact with industry, and on the other side the interest of individuals engaged in industry in the work of technical education. In a number of towns the arrangements are more formal, and permanent provision is made for organised and continuous co-operation. Highly developed examples of the second kind are to be found in London, Manchester, Bradford, Leicester, and Stoke-on-Trent.

It is, however, doubtful whether the full possibilities of co-operation between industry and technical education can be reached by means of Local Advisory Committees only. Such Committees are in certain respects indispensable, but they may not always reflect more than local experience or judgment. If, in each of the important industries, there is room for a national policy in the matter of the training of young workers in their occupations and through technical school study, it is improbable that it can be established through the separate action of Local Advisory Committees. There can be no doubt that technical schools, if only in enabling individual pupils to get a deeper and wider comprehension of matters concerning their occupations, have served to maintain, if not to advance, the standards of efficiency reached in our industrial establishments. But there has not yet been much serious study from the side of industry of the possibility of securing a definite contribution to industrial efficiency through a considered policy of technical school and other training for young employees. In some of the most important industries there are no organisations within the purview of which such questions would naturally arise. In some of the industries for which there are Joint Industrial Councils, the question of the training of the young workers has been considered, but in others it does not seem to be considered as of major importance. With a view to stimulating consideration in industrial circles of the problem of technical education, the Board have recently adopted the policy of preparing reports in which the provision of technical instruction in a given industry is reviewed for the country as a whole.* If each industry would consider from its own standpoint what technical education can do for it, would survey the existing facilities and see what gaps need filling, and what developments are desirable, and would take an active interest in the schools and give effective assistance in their conduct, it is probable that substantial improvements could be suggested.

* The series includes reports relating to various branches of engineering, coal-mining in South Wales, coal tar products, foundry work and leather. For complete list of these and other publications, see the Board of Education's "List of Official Publications."

Circumstances, no doubt, may now be, and may continue to be, unfavourable to progress in this direction. But unless the corporate interest of our industries in the subject of technical education is awakened, our technical schools may not be able to give much greater support to industrial well-being than they are giving at the present day. Local improvements in premises and equipment will, doubtless, be made; and in some places local collaboration between the industries and the schools may be strengthened. But we shall still lack the better direction of the efforts of authorities, teachers, students, and local committees, which might be supplied, for the several industries, on the basis of national industrial consideration of the training required by the several grades of the personnel employed in an industry.

Reference has been made above to the work of a small number of Joint Industrial Councils in connection with education. It is by no means certain that such bodies are in every case suitable for undertaking the work, since their specific objects are very varied, and include the consideration of wages, hours and working conditions, of measures for regularising production and employment and of machinery for settling disputes, the collection of statistics and information, the encouragement of the study of processes and design and of research, and the improvement of health conditions. Further, the Joint Industrial Council is sometimes concerned with only one section of an industry, whereas an organisation concerned with technical education for a complete industry, or for a group of industries, should usually be relatively complex. There are, for example, separate Councils for the carpet industry, the hosiery industry, and the woollen and worsted industry. Again, there are some important industries—cotton, general engineering and coal mining—which have no Council.

Another type of national industrial organisation is the Research Association (see Chapter IV, p. 306). Every Research Association so far established has taken powers "to aid the education of persons engaged, or likely to be engaged," in the industry concerned. The primary function of a Research Association is to obtain and disseminate knowledge, and aiding and encouraging technical education are functions related very closely to this.

There are thus two types of national industrial organisation having powers to assist in developing a complete and efficient system of technical education in this country, and it is quite probable that if they were to devote their serious attention to the matter substantial benefits would result.

It may happen that the leaders of an industry will be of opinion that neither the Joint Industrial Council nor the Research Association is quite suitable for dealing with technical education. In such a case, it is desirable that some other organisation which included a nucleus of energetic, enlightened and influential men should take the necessary action.

(*b*) *The Training of the Teachers.*—The importance of some action to ensure that teachers in technical schools shall receive better training is evident when the "life-history" of many of the existing teachers is considered. It is very often the case that a keen and promising student, after a successful career in an evening technical school, himself begins to teach evening classes in a subordinate capacity for one or two nights a week. As he gains experience and skill, he does more and more important work in the school, until he comes to be regarded as a permanent part-time member of the teaching staff. Such men as this are freely employed in technical schools. Although they usually bring great energy and intelligence to their task, they have often studied only a narrow range of subjects. In many cases they have taught in only one school, and tend to base their methods on those of their own instructors; as a result, their teaching lacks the breadth and resourcefulness that come from a wide range of studies and varied experience.

A certain proportion of part-time teachers, usually those in larger institutions, give up their ordinary daily occupation and become full-time teachers in technical schools. They are often quite successful, as they make up to some extent by their personal qualities for the deficiencies in their training. For a number of years the Board have conducted classes for teachers in technical schools with the object of improving their ability as teachers. The results have been very satisfactory, but the teachers who are able to attend the courses—which usually extend over a fortnight in July or August—form only a small proportion of the total number.

(*c*) *The Conditions under which Students Attend School.*—As regards the students, there is no doubt that attendance at a technical school on three nights a week during several successive winters, together with the homework necessary for sound progress, imposes a severe strain on many youths. An increasing number of employers in different industries recognise this, and arrange to allow "time off" during working hours to students who have shown diligence and ability to profit by the instruction provided in the technical schools. The wide extension of this system would do much to improve the qualifications of young men who are likely to occupy responsible positions in industry.

(*d*) *Premises.*—The variety of subjects taught in technical schools is so great as to preclude the suggestion of even minimum standards in the matter of premises and equipment as a condition of State aid to the instruction. Consequently, the work of the technical schools is still conducted to some extent under conditions which are tolerated rather than approved. When new premises are built for technical schools they are generally very satisfactory. But in some very important towns, and in many smaller towns, there is little prospect that in the near future the conditions will be made conducive to the highest efficiency. The outlook in connection with coal mining instruction is, however, more promising because of the

liberal allocations for premises and equipment which have been made by the Miners' Welfare Committee from the Miners' Welfare Fund (see "Survey of Industrial Relations," p. 196).

(*e*) *Possible Action by National Industrial Organisations.*—Assuming that a suitable national industrial organisation decides to attempt to improve the technical education of persons engaged, or likely to be engaged, in the industry with which it is concerned, what steps should it take? It should not aim at conducting or maintaining schools, but should confine itself to supplementing the work of Local Education Authorities and Universities. Its interest and power to co-operate in educational work will normally be small so far as the elementary stages of instruction are concerned, since instruction in them has little, if any, vocational bias. As the instruction becomes more advanced, it is necessarily more specialised, and accordingly the interest of industrial organisations and the assistance they can give are likely to be greater.

These are the limitations of the powers which can usefully be exercised on technical education by industrial organisations. Within these limits there is much useful work which they can undertake, and that of two kinds. First of all, a representative organisation can consider for its own industry how it should recruit the workers of different types and grades with due regard both to its own needs and to the reactions on the national welfare its method of recruitment is likely to have; it can consider how selected youths can be transferred from one job to another in order that they may have the necessary all-round knowledge of the industry; and it can give advice as to the steps to be taken by individual works in order to permit young persons to be released from employment with the least possible inconvenience in order to attend school during working hours. These matters fall entirely within the province of the industry, since they deal with recruitment, works training, and works organisation. If once they were decided and the decisions were generally accepted by an industry, the share of the burden of training learners which can properly be borne by the industry would be defined.

In the second place, a suitable industrial organisation can give a great deal of assistance to schools by setting out for the information of education authorities what the educational needs of different types of workers are. Although such an organisation is not skilled in the technique of education and has not the experience of schools and of students necessary to enable it to draw up syllabuses and curricula for technical schools, the presence of its representatives holding "watching briefs" on committees engaged in devising courses of instruction would be very valuable.

Again, an industrial organisation could grant scholarships to promising students. In order to do this economically, it would probably be compelled to consider carefully the whole question of

the way in which the more responsible posts are filled, the number of men needed annually, and the kind of qualifications they should possess.

It is not impossible that some industrial organisations might think it desirable to found lectureships or to subsidise existing lectureships in schools where they considered that the public provision was inadequate.

In any case, they might regard it as a wise expenditure to make small grants of money to part-time teachers to enable them to gain wider experience or to improve their qualifications by attending vacation courses of instruction.

Scotland.

(*Suggestions by the Scottish Education Department.*)

In Scotland the existing system of continuation class instruction has developed on lines and under influences somewhat similar to those in England. But there is one important difference between the two countries. In Scotland the Trade Advisory Committees have exercised a very considerable influence, especially in the larger centres, on the nature and extent of continuation class instruction for particular trades. The following may be cited as examples of trades for which active advisory committees have been formed :—

Engineering and allied trades.
Building trades.
Printing and allied trades.
Jute and allied industries.
Painting and decorating trades.
Baking and confectionery trades

In other industries and trades, managers' foremen, draughtsmen and others who are interested have proved exceedingly helpful in an advisory capacity, although in a less formal way. It is clear that great benefits would accrue if all these committees and agencies were properly co-ordinated, added to where necessary, and brought into closer touch with the whole system. This is every day becoming more desirable. In view of developments affecting the apprenticeship training system, it is fortunate that the continuation class organisation in Scotland provides admirable facilities for the institution of sound courses of theoretical and practical training, if only the earnest co-operation of the trades involved can be secured. In this connection, reference may be made to the recent action of the leaders of the typographical and the plumbing trades in Glasgow. When the Royal Technical College had to discontinue the technical classes for these trades, in order to make room for more advanced work in engineering, it was feared that the Education Authority might not be ready to take up the work at once, so that a hiatus was possible. When the danger was realised, representatives of the trades concerned approached the Education Authority with offers of

financial and other assistance for the provision of the necessary teachers, machinery and equipment to enable the instruction to be carried on without a break. These offers were cordially accepted, and the Printing School and the Plumbing Department were established forthwith in one of the Education Authority's centres to continue the work which was being relinquished by the Royal Technical College.

In Glasgow and the West of Scotland, where the largest part of the Scottish industrial population is concentrated, the arrangements for technical continuation class instruction are under the direction and supervision of the Joint Committee on the Organisation of Classes in Science and Technology. This Committee consists of a number of members representing educational institutions (such as the Royal Technical College, Glasgow, and the Educational Institute of Scotland), the educational authorities concerned and the Scottish Education Department. There is also a representative of the Institution of Engineers and Shipbuilders in Scotland. Although the last named is the only direct representative of industry on the Committee, quite a number of the other members are in fact actively interested in industry and trade. The committee is at present considering two points which have a very serious bearing on the efficiency of their work :—(*a*) The leakage of students who enter for classes leading up to the Junior Certificate of the Committee, and the Senior Certificate of Glasgow Royal Technical College, but fail to complete even the first stage of the journey, and (*b*) the suitability of the present syllabuses and groups of subjects in the courses for all—or even the majority—of the students who follow them. While the results of these enquiries are not yet known, it is possible that they may have a considerable effect upon the organisation of continuation classes in the area.

II. TECHNICAL EDUCATION IN RELATION TO PARTICULAR INDUSTRIES.

(*From material furnished by the Board of Education and the Scottish Education Department.*)

Mechanical Engineering.

Demand for and Supply of Technically Trained Staff.

Higher staff.—The appreciation of training in basic principles is widespread, but very variable among different firms, and frequently depends on the amount and kind of training the managers themselves have had. Most of the important constructional engineering firms, of course, demand and must have well-trained engineers, designers and draughtsmen. A principal designer is frequently a man with University qualifications, whose theoretical training, in conjunction with his shop and office experience, has enabled him to become a skilled designer of machinery an appliances suitable for

special purposes. Most of the big firms try to obtain young men who have come through or are still taking technical courses, and usually expect them to acquire in the actual experience of the workshop the special training required for their particular work. The supply of technically trained staff is, as a rule, more than equal to the demand in this country.

Operatives.—While little in the way of technical qualifications is usually demanded from the ordinary rank and file of engineering employees, encouragement is frequently given to the operatives to take up some appropriate form of technical education in evening classes, and there are cases where individual firms provide this within their own works or arrange for its being done outside. There are, of course, a number of industrial establishments with special systems for the factory training of apprentices or other young workers, and there are great possibilities in this method of promoting industrial efficiency.

Facilities for Technical Training.

In England and Wales the engineering industry is well provided with facilities for technical training wherever there is a call for them. The instruction provided is of the types briefly described below :—

(*a*) *Before entering Industry.*

(i) *Junior Day Technical Schools.*—These receive boys just before they reach the age of 14 and give them a training for two years, which includes instruction in drawing, mechanics, woodwork and metalwork as well as definite provision for continuing their general education. The total number of these pre-apprenticeship schools in England and Wales is about 60. They are widely scattered and exist in nearly all areas where the engineering industry is of considerable importance.

Broadly speaking, they are intended for those who will remain manual workers ; but this is by no means exclusively the aim, nor do all ex-junior technical school pupils remain manual workers.

(ii) *Senior Day Technical Schools.*—For those who will not be mainly manual workers there are in England and Wales full-time technical institution courses occupying two or three years, suitable for persons about seventeen years of age, who have just left school. They are, however, often attended by persons who have spent a period in engineering works. The number of persons taking such courses is well over 2,000. There is no sharp line of demarcation between these courses and those held in University institutions, the question of the classification of a particular course often depending in an arbitrary way on the management of the institution.

As regards the higher technical staff, schools of engineering exist at practically all universities and university colleges, and there are specialist courses in mechanical engineering at a number of the principal universities.

(*b*) *After entering Industry.*

For those already employed in the industry part-time classes, mainly evening but also in some cases partly or wholly in the day time, are held by arrangement with particular employers, and courses of this kind are widespread. They generally require attendance for at least six hours a week, and cover three to six years of progressive study.

The full-time and part-time courses do not usually include instruction in craftsmanship, and the amount of training in workshop operations is altogether relatively small. There are, however, signs of the growth of part-time courses (called "minor courses") based more closely on the workshop and mainly, but not entirely, intended for persons not having the ability or previous educational advantages to enable them to follow with profit the more scientific studies of the normal part-time course. Courses of lectures in "workshop production" have been established in Glasgow Royal Technical College and elsewhere in Scotland. These courses are proving popular and serviceable, and have, indeed, attracted quite a large proportion of works foremen.

In Scotland also the industry is well provided with facilities for technical training. Even in the smaller industrial towns, two, three and sometimes four-year evening engineering courses are often to be found, and these courses are linked up with the advanced technical instruction provided in the engineering and day classes of the central institution. In the central institutions, particularly in the Heriot-Watt College, Edinburgh, and the Royal Technical College, Glasgow, arrangements are made for transferring promising students from the evening to the day classes, in which they may study for and obtain a diploma or degree.

Owing to the fundamental nature of the subject and its direct dependence on first principles, the foundations of engineering study can be laid in intermediate and secondary schools, and in the advanced divisions of primary schools, by the introduction of mechanics, applied mathematics, practical plane and solid geometry, and drawing to scale in plan and elevation. This is done very effectively in certain engineering districts, notably on the Clyde, where many of the schools possess well-equipped mechanics laboratories, and class-rooms provided with copious supplies of typical examples of engineering practice, suitable for measurement and drawing. In these districts students often leave school fitted to join an engineering course in its second or third year, and so are able to carry on their technical education to a standard considerably higher than is ordinarily reached.

Relations between the Industry and the Schools.

In some districts the relationship between engineering firms and the local schools and classes is keen and cordial, while in others it is less so. In many engineering towns and districts the works and the education authorities are acting in cordial conjunction for the promotion of technical education, the education authorities providing classes and courses, while the employers and works managers do what they can to encourage attendance. In some cases regular attendance is made a condition of apprenticeship, but owing to varying local conditions this cannot be enforced universally. Many firms pay the class fees of their apprentices, and in a number of cases special premiums or additional increases of wages are awarded to employees on successful completion of each part of their studies.

Draughtsmen and overseers employed by particular firms often teach in the engineering classes, so that the instruction given there has every chance of being sound and appropriate.

In the West of Scotland the engineering apprentice makes free use of the " Sandwich " system of apprenticeship, whereby the apprentice spends alternate periods of six months in the college or university and in the workshops, the winter term being devoted to college studies, and the summer term to practical work. Thus, while the apprentice is a full-time student so long as he is at college, he is there for only six months at a time. This arrangement is found to work very well and to produce engineers well trained both on the theoretical and on the practical sides, with theory and practice well blended. It has another advantage. The connection of the apprentice with his firm is maintained throughout the whole period of his training, which usually exceeds the normal duration of five years.

Recent Action by Public Bodies.

In England and Wales the Board of Education have established a national form of examination for engineering certificates and diplomas. This requires preparation on lines approved by the Institution of Mechanical Engineers, which joins with the Board in making awards. The scheme has produced marked results in (i) the more satisfactory composition of courses of study, (ii) the more thorough carrying out of work attempted, (iii) the establishment of a large number of advanced classes, (iv) better equipment of schools to deal with their experimental work, and (v) greater keenness of students as shown by attendance and output of personal work.

A similar arrangement, with modifications to make it fit in with Scottish conditions, has been arrived at between the Scottish Education Department and the Institution of Mechanical Engineers, and is already proving very successful.

Shipbuilding.

Demand for and Supply of Technically Trained Staff.

The situation as regards the demand for and the supply of technically trained staff is much the same as in the case of mechanical engineering. There is a steady, if much smaller, demand, much reduced at present on account of depressed trade, for well-trained ship draughtsmen and designers, and the demand is more than met by the supply.

Facilities for Technical Training.

The situation as regards facilities for technical training is also much the same as in the case of mechanical engineering. Throughout the great shipbuilding districts, technical training for the naval architect and shipbuilder is well provided and, in general, well organised. There are junior technical schools in all the English shipbuilding areas, and part-time courses in naval architecture and subjects leading thereto are widespread. In the earlier stages the curriculum approximates closely to that of a mechanical engineer. The more specialised technical side of the instruction is usually in the hands of skilled men filling posts of responsibility in the design and drawing departments of shipbuilding yards who have studied specially at a technical college or university; and, as a rule, it is very efficient. There are full-time courses in naval architecture in the Universities of Durham (Armstrong College, Newcastle-on-Tyne) and Liverpool. In Scotland, under the affiliation schemes, the successful continuation-class student completes his studies in the evening classes of the central institution, or continues them in the day classes, where such have been provided, as in Glasgow, where there are both diplomas and degrees in naval architecture, the former being granted at the Royal Technical College and the latter at the University.

It may be added that the amount of theoretical instruction specially provided for manual workers (though all classes are open to them) is small, as the demand is small. There are one or two instances of instruction given by firms in co-operation with local education authorities, and one instance of instruction in shipyard manual operations given by a firm.

Reference must also be made to two educational institutions which are the peculiar creation of the Admiralty—the Royal Naval College at Greenwich and the Dockyard schools.* The College was for years the only school of naval architecture in Great Britain, and its old students are to be found in most of the large shipbuilding firms of the country. The College looks to the Dockyard schools for a supply of students, but it has not been their only, or perhaps the most important, part of their function to train students for entry to the College.

It is from the Dockyard schools that the great body of subordinate Dockyard officers come, as well as the craftsmen who

* See pp. 152–6.

fill the drawing offices at the Dockyards and the Admiralty ; and it is the Dockyard schools which have raised the educational and technical standards of the rank and file of Dockyard-trained mechanics, till it is higher, probably, than among any other class of mechanic in Great Britain.

Relations between the Industry and the Schools.

The relations between the industry and the schools are in the main similar to those obtaining in mechanical engineering. Shipbuilding firms in Scotland show an increasing interest in the system of technical education for the industry, and a growing desire to help.

Recent Action by Public Bodies.

The Board of Education and the Scottish Education Department respectively have completed arrangements with the Institution of Naval Architects and the Worshipful Company of Shipwrights for the issue under their conjoint authority of national certificates in naval architecture.

Electrical Engineering.

Demand for and Supply of Technically Trained Staff.

The electrical engineering industry is closely allied to that of mechanical engineering, and the electrical engineer must be first and foremost a mechanical engineer. There is, therefore, much in common in the training of the two. The industry is rapidly growing, and an extension of the present facilities for training for posts of intermediate and lower grade will be required. The skilled electrician who is able to adjust, repair, and, in some cases, construct electrical apparatus and machinery, is practically in as great demand as the skilled indoor workman, and the need for his efficient technical training is equally great.

There is at present a fairly steady demand for well-trained electrical engineers to fill those executive and technical posts under the various electricity supply companies and corporations for which an adequate technical knowledge of electrical principles and theory is essential. The various firms of electrical contractors also require well-trained staff and competent workmen. As in the cases of mechanical engineering and naval architecture, there is a plentiful supply of well-trained and technically competent men to fill the executive and managerial posts.

Facilities for Technical Training.

In the following table and notes, which relate to England and Wales, the general classification of the various workers employed in the electrical and allied trades is that adopted by the British Electrical and Allied Manufacturers' Association. In Scotland, while the electrical manufacturing industry is probably not quite so highly and specifically organised, owing to the very small number of electrical manufacturing firms in the country, the conditions are, generally speaking, similar to those in England.

Table showing Educational facilities in relation to various grades of workpeople in Electrical Engineering and allied trades.

Grade of Worker.	Previous Education.	Duration of specialised School or College course in years.	Age on entry to works.	Period of training in works in years.	Subsequent position in works.	Education concurrent with works training.	Duration in years of part time day or evening courses of 6 hours per week for about 30 weeks.
A Unskilled and semi-skilled.	Elementary ..	—	14	Various ..	Labourers, unskilled and semi-skilled workers.	(*a*) Day Continuation Schools.	2
						(*b*) Evening Classes	2 or 3
B. Trade Apprentices.	Elementary ..	—	14	5 years from age of 16.	Skilled workmen in all branches of the engineering trades, charge hands, leading hands, inspectors and foremen.	Part-time day or evening courses of Minor grade; or in particular cases of Major grade as below.	2–3
	Higher Elementary	—	15–16				
	Junior Technical ..	2 or 3 years after transfer from Elementary.	15–16				
	Secondary	—	16				
C. Engineering Apprentices.	Elementary and Secondary, or Preparatory and Secondary or Public School, up to attainment of about Matriculation Standard.	—	16–18	4 or 5 years from age of 16 or 17.	Positions in drawing office, works, test room or on engineering, commercial or erecting staffs.	Part-time day or evening courses for National Certificate in electrical Engineering:	
						Ordinary grade	3
						Ditto: Higher grade	2
D. Student Apprentices.	University or Technical College.	3–4 subsequent to Secondary or Public School.	19–22	2 or 3 years for graduates.	Foremen, senior positions in drawing office or works, or on engineering, commercial or [illegible]	Part-time day or evening courses for National Certificate, Higher grade.	2
E. Research Apprentices.	University ..	1 year subsequent to graduation.	22	1–2	Staff positions in Research Department of works.		

The following observations (A to E) relate to the various grades of workers referred to in the table :—

A.—*Unskilled and Semi-skilled Workers.*—Very few continue their education voluntarily after leaving the primary school. The only compulsory day continuation school at present existing is at Rugby, and here all young persons in any occupation between the ages of 14 and 16 attend the school for 7 hours a week in the day time, with valuable results. Speaking generally, this class of worker does not require technical education—his further education should be of a general type, except where he shows some special aptitude for technical study.

B.—*Trade Apprentices.*—The youth of 12–13 attending a primary school who is not able or willing to pass to a secondary school demands special consideration. The raising of the school age to 14 leaves unsolved the problem of an effective pre-apprenticeship training in the ordinary elementary school, where the curriculum is unsuitable. Higher elementary and central schools in some cases provide a course which is fairly satisfactory, but the best provision is undoubtedly to be found in the junior technical schools. Such schools follow a liberal curriculum, in which advantage is taken of the educative value of practical work. The number of schools established in works is small.

At the present time many trade apprentices attend evening courses of " major " grade for which they are not suited by their previous education in the primary schools. For such students there is need for a large extension of " minor courses " of artisan grade. The wide range of materials, tools, and processes employed in electrical engineering and the increasing subdivision and specialisation of labour are such that the necessary knowledge of a given trade cannot effectively be obtained only through manual experience, but must be supplemented by instruction in a technical school.

In the larger works the practical training of trade apprentices is carried out on a definite plan for each trade under an apprentice supervisor, but in smaller works and in electric wiring and fitting carried out by electrical contractors there is great laxity in the practical training. There is need for making a proper system of apprenticeship a necessary preliminary to the practice of an electrical trade. Such a system should combine training in the works and in school, and should include a definite test at the end of the apprenticeship.

C and D.—*Engineering and Student Apprentices.*—It may be said that ample provision exists for the training before entry to the works of Classes C and D who subsequently will occupy senior positions in the works. Indeed, it is likely that the number of men trained in the universities and larger technical colleges will not

only suffice for the senior technical posts, but will also extend to posts of lower grade, such as foremen and inspectors, which formerly were recruited from the ranks of skilled workers.

The technical education of apprentices of these grades during their employment in industry can best be carried out in part-time day courses rather than in evening classes; it is a mistaken policy on the part of industry to grudge the time given to day work.

E.—*Research Apprentices.*—A limited number of selected students are retained on research work at universities for a year or more after graduation by means of grants made by the Department of Scientific and Industrial Research. Such men ultimately take up paid posts in the research departments of the larger works.

There are schools of engineering, including electrical engineering, at most of the universities, and special facilities for, or courses in, electrical engineering at Birmingham, Cambridge, Newcastle-on-Tyne (Durham University), King's College, London (electro-chemistry), the Imperial College of Science and Technology, London, Manchester (electro-chemistry) and Sheffield.

The Scottish universities and technical colleges provide the same facilities for degrees or diplomas in electrical engineering as in mechanical engineering. In the evening continuation classes conducted in the larger centres there are special courses in electrical engineering, and in the smaller towns the electrical and the mechanical engineering courses are combined. Wherever there is any considerable desire for them, the larger Scottish centres provide operative electricians with classes in such subjects as electric wiring and telegraphy and telephony, ordinary and wireless. The demand for such classes is at present scarcely so great as the growing needs of the industry would seem to require.

Relations between the Industry and the Schools.

There are signs of an increasing tendency towards closer co-operation between the industry and the schools. This is particularly the case with the larger firms, whose representatives serve on local advisory committees on engineering, and committees concerned with after-care and juvenile employment. In such firms the apprentices are often in the charge of an apprentice supervisor, and records are kept of their progress in the works and in the school. Such firms also frequently lend or present apparatus and machinery for instructional purposes.

Four or five technical colleges in England, giving a full-time day training to their students extending over 5 years, have arranged with certain firms for mechanical training in works to be intercalated with the college training on a sandwich system. A considerable number of firms allow their engineering and student

apprentices to attend part-time day classes without loss of pay. Other firms pay the fees of apprentices attending evening classes. A small number of scholarships for full-time training at a university are given by the British Electrical and Allied Manufacturers' Association, and some firms award each year travelling scholarships to be held in the United States of America.

Recent Action by Public Bodies.

Following on the war the necessity for severe economy precluded an addition to equipment and accommodation in the schools, except in cases where the schools were engaged in the training of ex-Service men. During the last year or two, however, some much-needed extension of the equipment and accommodation of certain technical schools has been possible. The national certificates scheme established by the Board of Education in conjunction with the Institution of Electrical Engineers has already reacted favourably upon the teaching of electrical engineering throughout England and Wales. The Institution, however, unlike other professional bodies, have not seen their way to agree to such modifications of the English scheme as would bring it into consonance with the Scottish system of technical education. As a consequence, the only national diplomas and certificates available for the Scottish electrical engineering student are those in mechanical engineering issued by the Scottish Education Department and the Institution of Mechanical Engineers. These involve a considerable amount of study of the principles and practice of electrical engineering.

Iron and Steel.

Demand for and Supply of Technically Trained Staff.

Higher Staff.– For the general supervision and organisation of the works it is usual to look for men with an engineering training. Although there are exceptions, the engineering staff are not usually highly trained in a scientific sense, their function being to use and to maintain rather than to design machinery and plant. Young engineers are employed in the testing departments straight from college but in the general management of the works they must have had previous practical experience in order to take responsibility. The technical staff consists mainly of chemists and metallurgists, but the number of these and the degree of skill needed vary in different sections of the industry. In Sheffield, for example, the processes call for much skill in analysis and involve a high degree of scientific control, while in Middlesbrough the processes are simpler and less varied, the requirements are less exact, and a smaller trained staff for a given output will suffice. On the whole, it may be said that of recent years the supply of engineers and technical chemists has exceeded the demand.

This is due on the one hand to industrial depression and, on the other, to the abnormal output of the Universities in the years immediately following the war. Within the last few years the industry has realised that traditional methods must be replaced by those based on the recent remarkable developments in metallurgical science. There has, in consequence, been an increased demand for young metallurgists with the highest scientific qualifications—a demand which has sometimes tended to exceed the supply.

Acting under the principal chemist in iron and steel works, there may be one or more subordinates whose technical training is considerably lower, but who are quite capable of carrying on the day-to-day routine analyses which are constantly required. For such work the supply of applicants for posts exceeds the demand. During the war, boys were recruited from the elementary and secondary schools and pursued their training in evening classes. With the reduction in tonnage of iron and steel manufactures after the war, the amount of routine analysis fell, assistants were discharged, and fresh boys were not engaged.

Operatives.—In the case of the operative, technical training is probably less insisted on at present than is altogether good for the industry. The continuation of general education by individuals is usually due to their own initiative rather than to any concerted action on the part of the industry. An exception is provided by the Associated Foreman Smiths of Scotland, on whose application the Glasgow Royal Technical College instituted classes specially adapted to the needs of their members, the association guaranteeing the difference between the fees paid by the students and the fee paid to the lecturer.

Facilities for Technical Training.

(*a*) *Higher Staff.*—There are ordinary and specialised courses in various branches of chemistry and metallurgy in all the principal universities in England and Wales. There are also a number of Technical Schools, e.g., at Sheffield, Manchester and Birmingham (in receipt of grant from the Board of Education), in which full-time day courses in chemistry of 2, 3 or 4 years duration are provided. These courses may or may not include iron and steel or metallurgy among the subjects of instruction, but in any case they provide a sound training in chemistry and allied subjects.

For students who are already engaged in the industry and can attend only part-time, there are metallurgical departments at Sheffield, Manchester, and Birmingham, and at several institutions in London and at Wednesbury and Wolverhampton. Classes are held and equipment provided also at Middlesbrough, Workington, Smethwick, and Frodingham. The majority of the students are engaged in laboratories, and the training is of a professional character. In the larger schools it approaches the standard of honours degree work at a university. A few of the classes are of post-graduate type,

and meet the needs even of the highly trained men. The instruction is not merely in the chemical aspects. At Sheffield, Manchester, Birmingham, and London there are special facilities for the study of heat treatment, and laboratories for mechanical testing. Practically all the localities provide instruction in metallography.

For part-time as for whole-time students, the provision of instruction in engineering subjects is generally more widespread than in iron and steel, heat treatment and metallography, but no special classes bearing directly on the mechanical equipment and control of iron and steel works exist, and students in the iron and steel industry obtain their engineering instruction in the same classes as those whose aim is design and construction rather than maintenance or repair.

Diploma and degree courses in appropriate branches of applied science have been established in the technical colleges and universities of Scotland. Reasonable advantage is taken of these facilities, especially in Glasgow, where the majority of the students have naturally congregated. In the Royal Technical College, Glasgow, where, in addition to metallurgy, there are lectures on iron founding and on smith work and forging, the laboratories are spacious and well-equipped, and include a special laboratory for heat treatment. In addition to the ordinary laboratory work of the general metallurgical course, special laboratory courses have been instituted for students who wish to specialise.

(*b*) *Artisans.*—There is practically no provision in England for workmen or foremen or men holding minor positions of responsibility on the works side. This is largely due to historical reasons. The aim of technical education in the third quarter of the last century was the instruction of artisans, and in an industry which was primarily a craft or group of crafts, such as plumbing, building, etc., the artisan type of instruction has persisted side by side with instruction of a professional type ; but in other industries the more liberal provision of instruction in science classes, the improvement in the qualifications of teachers and changes in the organisation of industry, have led to a preponderance of the professional type, to the total or almost total exclusion of artisan training.

One unfortunate consequence of the absence of instruction of this type is that the evening schools for boys between 14 and 16 in iron and steel districts do not lead to any specialised studies.

In Scotland, the technical education of artisans is also largely of a general nature at present ; but after attendance at the continuation classes and courses which have been established in considerable numbers throughout the iron and steel districts, individuals may proceed to one or other of the more important county centres, such as Motherwell or Coatbridge, where they may take up the study of chemistry and mechanics, and get instruction in the principles of iron and steel manufacture. From these centres, again, they may proceed to the evening classes at Glasgow Royal Technical College, or, if they are aiming higher, the day classes are open to them.

Relations between the Industry and the Schools.

Generally speaking, the relations between the industry and the schools are hardly so close and well-organised as is desirable. There are, of course, individual and sporadic examples of co-operation—some firms send selected employees to part-time day classes, and others encourage them to attend evening classes. Gifts of money or equipment have been made to laboratories by firms and trade associations. Teachers act to a limited extent as consultants. It may be said, however, that a closer organic connection between the industry and the training institutions is highly desirable.

Recent Action by Public Bodies.

While the education departments are prepared to encourage the extension of technical education to meet the demand, the demand has decreased during the last few years, owing to industrial depression. Reference may be made to the establishment both in England and in Scotland of National Certificates in Chemistry, in which the study of metallurgy finds a place, and of National Certificates and Diplomas in Mechanical Engineering.

Coal Mining.

Demand for and Supply of Technically Trained Staff

Colliery firemen or deputies, under-managers, managers and surveyors are required by the Coal Mines Act, 1911, to possess certicates of competency, which are obtained by passing a statutory examination ; a period of practical training in the mine is an essential qualification for admission into these examinations. Hence there is a steady demand for well-trained and properly certificated persons, very many of whom are recruited from the ranks of the working miners, for these positions.

On the whole, the existing schemes of education maintain a supply of suitably trained persons more than equal to the demand, and the tendency is, therefore, for the standard of instruction to be raised, thus providing a supply of men of better training and education.

Some of the higher posts are filled by men of superior antecedent education who have obtained a degree or diploma at a university, university college or school of mines.

Facilities for Technical Training.

The training of the miner being essentially carried out in the mine, the best preparation for his work is a good general education, with special attention to such subjects as elementary mathematics, physics and chemistry. In some areas where mining is the chief industry, simple instruction is given in the last year of the elementary education in subjects which are likely in some measure to prepare the boy for his new environment, but this is by no means common. To some small extent persons who are destined to fill, or who hope to

secure, posts of special responsibility in the mine attend courses of instruction in schools of mining, or in the mining departments of certain universities, before taking up their practical work. Even in these cases a period of training in the mine before entering upon the course of study is to be recommended.

There are well organised and fairly complete schemes or courses of instruction for miners, provided by the responsible education authority, in practically all centres in England and Wales where mining is an important industry. There are usually mining departments in the larger technical institutes in mining areas, which provide technical instruction for persons engaged in coal mining whose educational attainments, as a result of attendance at more elementary classes, are such as enable them to benefit by instruction of a more advanced standard. Unfortunately, however, unless the working miner has an ambition to better himself by qualifying for an appointment as fireman, deputy, under-manager or something higher, there is little likelihood of his continuing his education, although, from the point of view of safety alone, it is very desirable that he should receive some instruction.

At the initial stages boys entering a mine tend to neglect their education altogether, and even when they aim at qualifying ultimately for an official position they allow several years to elapse before they enter on a course of study in continuation classes. This is because no official examination is open to the young miner until he reaches the age of 23, whatever his industry and attainments. Hence it cannot be said that the facilities provided are utilised to anything like the extent that is to be desired. It would probably be an exaggeration to say that more than 2 per cent. of the persons employed in coal mining in England and Wales receive any kind of further education. One of the chief difficulties is that mine workers can only attend evening classes after their day's work; another serious difficulty is the shift system, which makes regularity impossible.

There are schools of mining in the Universities and University Colleges of Birmingham, Cardiff, Durham (Armstrong College), Leeds, London, Manchester, Nottingham, Sheffield, Edinburgh (in association with the Heriot-Watt College), Glasgow, and also in the Royal Technical College, Glasgow. The South Wales and Monmouthshire School of Mining is provided and maintained by a group of colliery undertakings with aid from the Board of Education. No educational institution in England or Scotland of any comparable importance is maintained on this plan.

In Scotland there are two distinct groups of coalfields—an East of Scotland group, covering Fife, Kinross, Clackmannan and the Lothians, with its principal centre in Edinburgh; and a West of Scotland group, with its principal collieries in Lanark, Ayr, Stirling and Dumbarton, and its headquarters in Glasgow. Well-organised courses of instruction have been established throughout practically

all the mining districts. The earlier years of the courses are taken locally, and the syllabuses of instruction are closely co-ordinated with and lead up to the work in the county centres of instruction. Most of the latter are well equipped with machinery, apparatus, and materials, and can thus provide advanced instruction in practical mining. These centres in their turn send on their students to the mining departments in the central institutions and universities, which are fully equipped, provided, and staffed, and prepare their students for a degree in mining. There are thus two complete schemes of mining instruction in Scotland, one for the eastern coalfields and the other for those in the west, leading without a break from the preliminary classes in the village schools to the mining degree courses in Edinburgh and Glasgow respectively.

Scholarships granted by the education authorities enable picked evening-class students to enter the diploma or degree courses at Edinburgh or Glasgow, and further progress may be aided by the remission of fees or the award of bursaries.

Relations between the Industry and the Schools.

Although individual colliery firms in several of the coalfields encourage and support the development of schemes of education, and grant facilities for their employees to attend courses of instruction, it cannot be said that there is a large amount of interest or co-operation on the part of organisations either of employers or of workers. As stated above, the South Wales and Monmouthshire School of Mining is provided and maintained by a group of colliery undertakings with aid from the Board of Education.

The Scottish Mine-owners Associations have made provision for grants for the assistance of mining instruction in the Universities and Technical Colleges at Edinburgh and Glasgow. At various times, too, they have given equipment to certain other authorities providing instruction in mining.

Recent Action by Public Bodies.

The Miners' Welfare Committee, which is charged with the administration of the Miners' Welfare Fund (see "Survey of Industrial Relations," pp. 196–7), has given considerable financial assistance by the distribution of grants to educational bodies. The grants are given for the purposes of research and for the provision of necessary schools, apparatus and equipment. They have been made with admirable judgment, and have proved invaluable.

The County Education Authorities in ten counties in England and Wales employ properly qualified persons to act as county organisers of mining instruction. These organisers, with the heads of departments in certain of the more important technical institutions which have mining departments, have formed themselves into an association for the purpose of developing and improving schemes of education. Part of the object of these schemes is an improvement in the standard of safety.

Cotton (England).

Supply of and Demand for Technically Trained Staff.

Except for the relatively few men with scientific qualifications required by the finishing trades and the research departments, there is very little demand for staff technically trained in the sense that they must have passed through some course in the schools. It should be remembered that the larger number of workers in the weaving section of the cotton industry are females, for whom technical education is not necessary. All they require for the purpose of enabling them to carry out their duties satisfactorily is instruction from more experienced workers in the art of manipulating the threads, and such knowledge of the machine on which they intend to work as can only be acquired at the mill. The industry generally places its reliance on practical efficiency resulting from experience. Higher posts are filled either by promotion from the ranks of the operatives, or by the appointment of persons who have entered the industry with very definite prospects, through family connections or other favourable circumstances, of occupying responsible positions. If a man who is promoted has had some technical training, it may be placed to his credit, but generally speaking it is not a matter of more than secondary importance. The number of responsible posts is small in comparison with the total number of persons employed.

Very few firms pay much attention to the pre-industrial training of the entrant, but if he shows promise after he has entered the mill most firms will give him opportunities. So strong and widespread is the opinion that to succeed he must enter at the earliest possible age and grow up in the actual practice of his trade, that practical experience is often regarded not merely as an essential part of his training, but even as the only training that matters. Thus, while facilities for training by means of part-time day courses or evening classes are extensively provided and attendance at these is encouraged, the provision for full-time courses is small and not greatly utilised.

The full-time courses suitable for persons about to enter the industry which are provided by the four technical schools mentioned below are attended by about eighty students, the majority of whom have relations or friends in the industry on whom they rely for positions at the end of the course. They are often sons of employers and managers, destined to take similar positions. Unless the student taking the full-time course has some such backing he will generally have to enter the industry at the bottom. Attendance at full-time courses by persons already employed in the industry involves leaving their industrial position and taking the risk of not getting back at the end of the course. In present circumstances it is difficult for the industry to give encouragement to such men. Most of those who take the step do so as holders of scholarships. Of 99 ex-full-time students recently traced, 38 gained responsible positions in the industry, 6 became teachers and the rest either reverted to positions

which did not justify the cost of the training or disappeared from the industry altogether. In view of these difficulties, and the educational difficulties which arise when men of more or less mature age leave their employment to take a full-time course, there is a disposition on the part of education authorities to reduce the number of full-time scholarships, and to increase the number of part-time scholarships. This meets with the approval of those in the industry who are interested in educational questions.

It should be added that in recent years one large combine has trained selected men from the older universities for managerships by causing them to work as ordinary workmen for a certain length of time in each department of the mill, afterwards posting them to the various mills of the group. The principal director declares that the experiment has been successful.

A few firms have research departments which they staff with men who have taken good science degrees at the universities.

In the finishing trades a scientific training is generally expected in those who take responsible posts.

Facilities for Technical Training.

From the following description it will be seen that there is access to some measure of technical training for every person engaged in the industry. It may also be mentioned that certain firms provide day continuation schools for their young employees or make use of such schools provided by the education authorities. Technical training is not undertaken in these schools, but they have the effect of making the industry more attractive and of improving the demeanour and general efficiency of the employees.

(i) *Full-time.*—The Manchester College of Technology is an institution of university rank. In addition to providing degree and diploma courses in textile industries and the chemical technology of textiles, it provides a full-time non-degree course covering two years, a part-time day course and part-time evening courses and classes in textiles (cotton) and chemical technology.

Four technical schools in England provide full-time day courses extending over two years, composed of classes in cotton spinning, weaving, mathematics, science, economics and similar subjects suitable for persons about to enter the industry.

(ii) *Part-time Day Courses.*—Six technical schools, besides the Manchester College, provide courses of this type. The majority of the courses are made possible by the co-operation of employers with the school in arranging that employees shall be allowed time off to attend the school for certain periods each week. Generally the employers send their most promising youths, take an interest in their progress and give due consideration to their school record when promotions are being made. As these courses do not involve a complete break in the industrial career of the student, the industry views them more favourably than the full-time courses.

(iii) *Evening Courses.*—In every district where the cotton industry is of importance, evening courses in cotton spinning, cotton weaving or cotton bleaching and dyeing are available. About 33 technical schools are concerned and over 5,000 students are in attendance during the session. These courses include instruction not only in the textile subjects, but also in auxiliary subjects such as mathematics, drawing, design, mechanics, chemistry and engineering. They entail attendance on at least three evenings a week for about 30 weeks a year during four or five years. Usually they prepare for examinations held by the Union of Lancashire and Cheshire Institutes in the first three years and by the City and Guilds of London Institute in the fourth and fifth years. These examining bodies co-operate in arranging suitable progressive syllabuses and in co-ordinating the examinations. The same textile advisory committee, representative of the industry, the education authorities and the teachers, serves both bodies If certain conditions are fulfilled, the certificates awarded by these bodies are endorsed by the Board of Education.

Evening courses do not profess to train students for any specific position and one finds in all grades of the industry men who have depended on them for all the technical training they ever had. The possession of the certificates of the City and Guilds has long been and still is regarded as the hall-mark of technical training. Evening classes hold a traditional place in the esteem of the industry. Many employers show their belief in them by encouraging their employees to attend, paying their fees, watching their progress and taking their achievements into account in making promotions. This attitude to evening classes will be understood when it is remembered that a very large percentage of the employers themselves have passed through them.

(iv) *Scholarships, etc.*—Nearly all the education authorities provide scholarships, either full-time at Manchester, or part-time at Manchester or some other approved school.

The Textile Institute is specially concerned with the advancement of science and technology in relation to the textile industries. The recently obtained Royal Charter of Incorporation will enable the Institute, in addition to its other powers, to hold examinations and grant diplomas and certificates of competency to practise, teach or profess textile technology.

Under the Crompton Prize Scheme of the Textile Institute, prizes to the value of £100 are awarded annually for albums of patterns designed and produced by students. Similar awards are made by the Lancashire County Authority.

Relations between the Industry and the Training Institutions.

The closeness of the co-operation varies considerably from district to district, and depends generally on the vitality of the training institution. In many districts relations are very good indeed, and the industry shows its appreciation of the efforts of the school by valuable gifts of yarn, machinery and equipment. In not a few cases members of the industry form committees to act in an advisory capacity to the school authorities. There has recently been considerable improvement in this direction, partly as a result of the activities of the Cotton Research Association, which has been instrumental in establishing a very useful Joint Standing Committee on Education for the Cotton Industry, including representatives of both industrial interests and official educational interests.

This Joint Committee is making a thorough investigation into the subject of Technical Education as applied to the cotton industry. It has decided that for the time being the syllabus of the Union of Lancashire and Cheshire Institutes for the first three years and that of the City and Guilds Institute for the remainder of the course are satisfactory as affording suitable training for persons employed in the industry. In addition discussions are taking place with a view to providing special classes to give instruction in general education with some advanced technical instruction for those of mature age who have reached some degree of efficiency in the practical work, and who, owing to lack of general and technical education, are experiencing some difficulty in making further progress.

In the inspection of the work of technical schools the Board of Education employ the services of persons from the industry to assist His Majesty's Inspectors. The examiners of the Union of Lancashire and Cheshire Institutes and of the City and Guilds of London Institute are for the most part persons occupying responsible positions in the industry.

Recent Action by Public Bodies.

In order to promote the efficiency of the system of examinations, and thereby to improve the work of the schools, the Union of Lancashire and Cheshire Institutes has formed a panel of persons engaged in the industry who are willing to assist the ordinary Textile Advisory Committee with special advice relating to particular problems.

The recent provision of a special technological matriculation examination by the universities will open the door to higher technological studies to worthy students who have hitherto been unable to qualify for the more formal matriculation.

Considerable improvement in the standard syllabuses of study followed by students in evening technical schools has recently been effected through the co-operation of the education authorities and the examining bodies. It is not too much to say that these bodies are working more smoothly in relation to technical training for textiles than ever before.

Jute and Flax (Scotland).

Facilities for Technical Training.

As Dundee is the chief centre of the industry, the Dundee Technical College provides full courses of training in jute manufacture, both in day and in evening classes. It also provides complete instruction in flax-spinning and linen weaving, the two textile industries having much in common.

The textile department of the college is generously equipped with preparing, spinning, and weaving machinery, modern types being well represented. Examples of new machinery and adaptations are added as these are introduced—often in the form of permanent loans made by textile engineers or inventors. In this way new appliances are brought quickly and prominently to the notice of the industry.

In Aberdeen, and in the industrial towns surrounding Dundee, e.g., Forfar, Arbroath, Montrose, Dunfermline, Freuchie, and Perth, considerable provision has been made for carrying on technical instruction in textile manufacture. The courses sometimes extend to the third, or even to the fourth year. Some of the local manufacturers give encouragement to their employees to attend the classes, and have supplied, or lent, machinery for instructional purposes.

While Aberdeen may be regarded as a centre by itself, making its own provision for technical education in textile subjects, the manufacturing towns around Dundee correlate their instruction with that given in Dundee Technical College, to which they regularly send students to complete their courses.

In Dundee itself, the education authority have established a complete system of continuation classes in which textile workers can get all the preparation they need for the more advanced studies of the technical college. The preliminary work in mechanical and textile engineering is well provided for in the secondary schools and continuation classes. Experience shows that a good secondary school education, including experimental science, mathematics, solid geometry, and technical drawing, provides an admirable foundation for a course of study in textile subjects.

Supply of and Demand for Technically Trained Staff.

In the textile industry the demand for such a staff is, and always has been, steady, but much too limited, both in Scotland and elsewhere. But some of the more enlightened and progressive firms show more vision in this matter. Not a few of them encourage selected employees or prospective employees to study the jute industry in the Dundee Technical College for two years or more. In addition to Scottish students, who are naturally the greatest number, there are to be found in the college Frenchmen, Germans, Spaniards, Indians, and Japanese, all engaged in the study of textile manufacture.

The attendance at the day classes in Dundee Technical College is too small, considering the nature and importance of the industry to Dundee and district. The evening classes, however, are large and well attended, and both the City and Guilds of London medals and prizes, and the Drapers' Company scholarships, are eagerly competed for. Unfortunately, the age limit of 23 debars some of the best men from gaining these scholarships, which provide for attendance in the day classes of the College.

The supply of technically trained staff on the administrative and technical sides is just about equal to the demand, as the firms themselves send their prospective managers and directors to be trained at the Dundee Technical College. The full-time courses provided are eminently suitable for the young men who are to fill the highest positions in jute mills and factories at home and abroad. Unless, however, the home student has relatives or friends to assure him of a suitable post in jute manufacture on completing his course, he runs a serious risk of finding himself without one.

So far as under-managers, foremen, leading hands, tenters, and operatives in general are concerned, the evening classes in Dundee Technical College, and the continuation classes in Dundee and elsewhere, meet all the present requirements, and a considerable number come for training every year. The supply from this source is probably quite equal to the home demand. A steady demand which comes from the jute mills in India, and on the Continent, for trained managers, overseers, foremen, and mechanics, is usually supplied by men who have received their industrial training in Dundee works, and their technical education in the evening classes of the technical college ; although a request for a man to fill a post of some little responsibility overseas cannot always be met without delay.

Relations between the Industry and the Schools.

The industry is sympathetic towards the College and its tributary classes, and when equipment and funds are required for instruction in textile manufacture it is always ready to supply them.

Recent Action by Public Bodies.

The problem of the boy in the jute industry is being investigated by the Dundee Juvenile Advisory Committee (which is composed largely of members of the education authority and the Jute Manufacturers' Association. The employers in the jute industry have agreed to appoint representatives to visit the continuation classes with a view to advising those students who are engaged in the industry. Individually, too, they have undertaken to assist promising students in their own works to prepare themselves, by study and otherwise, for staff appointments. There are thus signs of progress, which it is hoped may ultimately be of great benefit both to the industry and to the prospects of its youthful employees.

Woollen and Worsted (including Hosiery.)

Demand for and Supply of Technically Trained Staff.

In England and Wales the industry takes in the majority of its recruits as they leave the elementary school, and there is no special previous training. A few boys may have been through an engineering junior technical school, and boys with special influence may enter after a secondary school training, or possibly after a textile course in a college ; but these exceptional cases are for the most part boys who hope to devote themselves to the financial rather than the industrial side. It is very uncommon to find an overlooker or manager who has entered the mill with any special preparatory training, and the majority of the workers do not attend any classes after entering the mill.

Speaking generally, the industry demands that technical training shall consist of instruction—supplementary to works experience—which shall give the students a full and intelligent knowledge of the materials and existing processes of the mill and enable them either to perform or to supervise certain well-defined work with accuracy, intelligence and speed. This work may relate either to a single department of the mill or to the complete series of operations involved in the conversion of greasy wool into finished cloth.

The training of this type is good, so far as it goes, though insufficient attention is paid to the necessity of equipping students to cope successfully with fresh problems ; in other words, the importance of knowledge is emphasised and the importance of self-reliance and resourcefulness is not, though naturally these qualities are possessed by most of the students who are willing to undergo the strict discipline of a prolonged part-time course, demanding attendance at school for three nights every week in the winter and the devotion of much time to independent work at home.

At the present time there is no general belief in the value to the industry of men with a wide and sound knowledge of pure science and an ability to apply this knowledge to mill problems, though it is probable that a number of such men, suitably distributed, would ultimately exercise a very beneficial influence on an industry so isolated educationally as this now is from other branches of technology. There are, however, signs that public opinion in the industry is changing as a result of the work of the Research Association for the Woollen and Worsted Industries, and it may be confidently expected that sooner or later the industry will demand the services of men who are able both to suggest what industrial problems are suitable for investigation by the Research Association and to indicate how best the results of research can be applied to mill practice.

During the last five years the interest taken by English manufacturers of hosiery goods in the technical education of persons engaged in their industry has greatly increased. At Nottingham local classes,

working in connection with the Textile Department of the University College, are being carried on, and the Department itself is very active. There is in Leicester an enthusiastic Technical Advisory Committee, to whose chairman the local technical college is greatly indebted for the growth in the industry of a belief in the value of technical education, for a better definition of what technical schools can do for an industry and for substantial gifts. Generally, there is reason for believing that technical education will be in the future of much greater value to the hosiery industry in England than has been the case in the past.

In Scotland, especially in the South-East, where the woollen, worsted and hosiery industries are chiefly carried on, systematic technical education has been developed; the employers display a keen interest in the technical instruction of their employees, and there is a constant demand for well-trained men. The institutions described below, and other special classes, are well able to supply all the present demands. The possibilities of extension in the future are considerable, and the industry itself will see to it that all reasonable requirements are speedily met.

Facilities for Training (*England and Wales*).

(a) *Before entering the Industry.*—It has already been said that the industry recruits the bulk of those engaged in it from the elementary school. A certain number of boys go into the mills from secondary schools—usually in privileged positions. Some of these take a full-time course of two or three years' duration, often at Bradford or Huddersfield Technical College or in the Textile Department of Leeds University, between leaving the secondary school and entering the industry; there is, however, a tendency for boys who have some family connection with the industry to divide their time between day attendance at textile classes and work in the mill, and this practice has certain advantages.

(b) *After entering the Industry.*—Evening classes are held from September to April in all the larger towns where the industry is carried on, the most important schools being at Bradford, Huddersfield and Halifax. Senior courses extending over three years from about the age of sixteen are provided in woollen and worsted spinning and manufacture, and these are followed in the principal schools by advanced courses usually extending over two years. In the senior and advanced courses the study of textiles is associated with that of certain auxiliary subjects—mathematics, physics, chemistry, mechanics, drawing or design. A few firms take an active interest in the school training, but the industry as a whole shows no sign of encouraging attendance.

Facilities for Training (*Scotland*).

In Galashiels there is a flourishing institution known as the Scottish Woollen Technical College, which is entirely devoted to education

and research in the principles and practice of the manufacture of woollen and worsted cloth. The college is in the centre of the manufacturing district, and, surrounded by firms of the highest reputation, it is kept in the closest touch with the best practice in the industry.

In the various woollen manufacturing towns in the district, continuation classes have been established, leading up to the more advanced technical instruction in the college.

The centre for technical education in the hosiery manufacturing industry is the Buccleuch Memorial Institute, Hawick, which is strongly supported by the Hawick Hosiery Manufacturers' Association. This association makes generous provision for material for the use of the students, and also supplies valuable machinery whenever it is required.

The technology of hosiery is still in its infancy, and has not yet been worked out so completely as the technology of woollen manufacture generally. But a beginning has been made. Saturday classes for hosiery operatives have been running successfully for some time, and day classes are now being arranged for the summer months, when the demand for hosiery goods is less active.

In Glasgow there is the textile department of the Technical College. This department is well equipped with machinery and appliances for the manufacture of tweeds, and for the weaving and knitting of woollen goods generally, and it provides excellent courses of technical instruction. There are always capable and earnest students in the textile department, both in the day and in the evening classes, but mainly in the latter.

Relations between the Industry and the Schools.

As regards England and Wales, while there is a close personal relation between individuals in the industry and in the schools, and in many cases effective advisory committees exist, so far there has been no co-operation of the industry as such with the local education authorities, and the present courses are not definitely encouraged by the industry as a whole.

In Scotland, while one or two individuals are still a little sceptical of the value of technical training, the general attitude is much less hostile than it was a few years ago, and the industry as a whole is keenly interested in the schools.

Recent Action by Public Bodies.

The British Research Association for the Woollen and Worsted Industries grants certain scholarships, and gifts of machinery have been made by the Hawick Hosiery Manufacturers' Association, and other organisations.

Clothing and Boot and Shoe Manufacture.

Clothing.

The industry of men's clothing, as conducted on factory lines, is of comparatively recent growth. Except in the case of a few outstanding firms, cheapness has been the governing factor, and a tradition of craftsmanship has not generally been associated with this development. In the bespoke tailoring trade the cutter is usually also the foreman, and is responsible for the instruction and supervision of the work of the sewing tailors in all its stages. In the wholesale ready-made trade his duties are confined to the actual cutting out of the cloth, usually with the aid of cutting machines, in accordance with patterns graded to the sizes required. These patterns or models are prepared by a skilled cutter, who must have had training and experience similar to that of the bespoke tailor. It is thus evident that practically all the factory workers (very many of them women) are engaged in routine operations, and most of them are never required to attain dexterity outside a very restricted process or machine. A single individual with skill and training as a cutter of original patterns may serve the needs of a whole factory.

Employers usually prefer to train their own workers, and appear generally to hold the opinion that the technical school would be of little benefit to their employees.

Enquiries at important centres of the trade in Yorkshire seem to indicate that attendance at tailoring classes is not dictated by considerations of increased efficiency or prospects of promotion, but that the aim of the workers who attend is rather to gain knowledge which will enable them to carry out work privately for themselves or others ; or, in some cases, their object is to leave the factory and enter the retail or bespoke trade.

A recent development is the making of garments in the factory to special measurements in fulfilment of orders from retailers in various parts of the country. This development, which is of some importance in Leicester, Leeds, and some other centres, creates a demand for a number of skilled cutters able to cut patterns from the measurements supplied ; and special classes to provide training for cutters of this kind have been successfully conducted at a technical school in Leeds.

In Scotland there is a growing tendency in the tailoring trade for at least some part of the training to be obtained in continuation classes, and employers are encouraging their assistants to attend the classes which have been instituted for their benefit. The increase of this type of class has been very marked in recent years. The central institutions, and several of the county centres, provide efficient courses of instruction in men's, and sometimes women's, tailoring, cutting and fitting, and the practical

sections of these courses are taught by highly skilled trade instructors. Continuation classes in dress-making and millinery are provided wherever there is a sufficient enrolment to warrant their formation. It may be added that while workers for the less skilled operations are obtained without difficulty, the supply of trained cutters and fitters is rather inadequate. In England and Wales no evidence has been found of a shortage.

Boot and Shoe Manufacture.

As a rule, boys and girls enter the factories when they leave the public elementary school and up to 18 carry out the simpler operations of the manufacture. But a *junior technical school* to prepare boys for entry to the trade has been instituted at the Cordwainers' Technical College in London. This experiment is being watched in other centres of the industry, where the same idea has been under consideration.

Full-time day courses lasting for one or two years have been organised for the special benefit of sons of manufacturers and others in the trade, who will in course of time become owners or managers of factories, or of those who have shown exceptional ability in the factory and are likely to rise to responsible posts. A few students who can only spare time for some of the subjects also attend. In these schools, where the number of students is very small, instruction is given in the practice and theory of foot-wear manufacture and in those matters connected with the conduct of a modern factory such as costing, bookkeeping, accountancy, marketing and factory organisation.

Part-time training in the evening for students over 16 is available in all the large towns where the industry is carried on, and in several of the smaller towns and larger villages in Northamptonshire. The separate machine processes of the industry are so numerous that each operative becomes, through practice, a high-speed worker in one process, but has no opportunity, as a rule, to learn in the factory much about the operations which precede or follow his own. Both employers and workpeople now recognise that with such knowledge, which can be acquired in a well-found technical school, the work of the individual could be improved in quality with a saving of time and material. Schemes of instruction in a subject or group of subjects are often arranged to cover two or more years, but beyond this there is no very clear-cut course organisation. The course will depend very much upon the department of the factory in which the student is working. The general idea is to acquaint the student with the processes besides his own which are carried on in the department. In some cases it is thought desirable for the student to make a boot or shoe, from start to finish, by hand. The schools can provide the necessary tools, materials and instruction, and can supplement this kind of training, and the training given in factory processes, by teaching also such simple mathematics, drawing and elementary principles

of science as are necessary. The more capable and ambitious students have opportunities of studying such matters as are important to factory managers.

Relations between the Industry and the Schools.

Technical education for this industry is approved both by employers and by the workpeople. In Northampton in particular a lively interest is taken in the work of the technical school in this branch.

Recent Action by Public Bodies.

The Federation of Boot and Shoe Manufacturers' Associations is promoting the formation of an institute for advancing technical education and research in connection with this industry. The proposed institute will probably act in close co-operation with the local education authorities and the schools.

The Chemical Industry.

Demand for and Supply of Technically Trained Staff.

The processes followed by the chemical industries call for extensive scientific control by a highly trained staff of chemists, who have for the most part been trained in the universities. Some of these are engaged wholly in research. There is also a steady demand for young men or boys, who have sometimes a very small knowledge of chemistry, to act as assistants, under the direction of a skilled chemist.

A suitable engineering staff is also necessary for the maintenance and repair of machinery and plant. This work is also under the direction of men with university training, and is carried out by men who have not necessarily much theoretical knowledge.

As regards the supply of highly trained chemists and engineers, reference may be made to the earlier Sections on Iron and Steel and Mechanical Engineering.

Facilities for Technical Training.

Reference may also be made to the Sections on Iron and Steel and Mechanical Engineering for information regarding the facilities provided by the universities and institutions of similar rank.

For those who have not yet entered the industry there are in England and Wales a number of technical schools in receipt of grant from the Board of Education, in which full time courses in pure chemistry, physics, and engineering of two, three or four years' duration are provided ; all of these could take more students. For entry, students are expected to have received a secondary education, but need not have matriculated.

For those who are already engaged in the industry there is ample provision in local technical schools (where pure chemistry, physics, and engineering are also taught), and considerable numbers avail themselves of the opportunity. There is a case in the heavy chemical trade where the technical school is at an inconvenient distance from the works; in this case more use has been made of young men trained before entering the industry, and there has never been any very satisfactory arrangement for training the boys engaged in routine tests. The engineering apprentices, on the other hand, have availed themselves more freely of the facilities provided. Under more favourable conditions elsewhere both types of student obtain instruction in evening classes which reaches a very high standard, comparable in many respects with that required for an honours degree at a university.

In Scotland elementary courses in chemical science are usually provided in the larger county centres wherever they are called for, and the student may proceed from them to the central institution for more advanced instruction, or he may go straight from school to the university.

Relations between the Industry and the Training Institutions.

The great alkali firms were among the first to make attendance at evening schools a condition of employment, and have always behaved most generously towards technical education in their neighbourhood. It is noteworthy that for at least sixteen years the only instruction in the technical application of science to the industry, as distinguished from the teaching of pure science, was in alkali manufacture. This was at one centre only and is not now in existence. The employers approve the teaching of pure science but not of technology. They prefer that the application of scientific principles to the problems of their own business (where highly special and often secret processes are involved) should be learnt in their own works; and as the processes and the problems which arise involve a knowledge of pure science, a purely scientific training is essential.

The Glasgow Royal Technical College is the oldest British school of industrial chemistry. There is a close connection between the college and the shale industry, and research workers have been maintained within the college for some years by the Scottish Shale Oil Research Association. Past students of the college are to be found in responsible positions in a great variety of industries. There is also quite a close connection between certain special branches of the chemical industry and the continuation classes and technical colleges, but a far larger proportion of those engaged in the chemical industries might with advantage undergo systematic training. This will not be brought about unless the industry as a whole takes a keener interest. The value of such training has been fully realised by one great explosives firm, by whom a comprehensive course of

instruction in technical chemistry has been drawn up in conjunction with the County Education Authority and the Glasgow Royal Technical College. The first part of the course is carried out in the continuation classes, and the instruction is continued, under the Authority, in well equipped laboratories in one of the firm's factories. Here teaching of a high standard is given by members of the firm's staff, who are honours graduates in technical chemistry. The students may then study in the day classes of the College for the diploma or degree in applied chemistry, or for the associateship or fellowship of the Institute of Chemistry. All the members of the firm's staff attend these classes as part of their training, and many of them continue their studies to the graduation level.

Recent Action by Public Bodies.

Reference may be made under this heading to the Sections on Iron and Steel and Mechanical Engineering. It should be added that under the auspices of the Board of Education, the Scottish Education Department and the Institute of Chemistry, National Certificates in Chemistry have been instituted, and the system is working with marked success.

A scheme for the award of National Certificates and Diplomas in connection with the gas industry, applicable to the whole of Great Britain and Ireland, has also been established in collaboration with the Institution of Gas Engineers. The scheme differs from those for chemistry and engineering, but works in conjunction with them so far as the ancillary subjects are concerned. An Advisory Committee, representing all the bodies interested, deals with all matters relating to the schemes, including curricula and examination, and the arrangements are working very satisfactorily.

III.—COMMERCIAL EDUCATION IN ENGLAND AND WALES.

(i) Under Local Education Authorities or Governing Bodies of Grant-Aided Schools.

(*Furnished by the Board of Education.*)

Introductory.

1. In this memorandum commercial education is taken as covering instruction in—

(i) Subjects related to office work, such as arithmetic, shorthand, typewriting, book-keeping and commercial correspondence;

(ii) The theory and practice appertaining to several occupations closely connected with commerce, such as banking, insurance, accountancy, transport, and company secretarial work, in which there are professional or quasi-professional organisations;

(iii) The modern foreign tongues which are commercially important;

(iv) Other matters which bear on commerce, such as geography in its commercial aspects; history of commerce; the organisation of commerce in general; the organisation of particular branches of commerce; economic theory generally; business economics; important commodities, their sources and varieties and the methods of dealing with them; banking, insurance, accountancy, finance and transport as they concern the trader; and so on.

2. The public provision of commercial education outside the universities was made in the first instance to satisfy the demands of persons employed in offices, or desiring such employment, for a knowledge of the clerical arts, or of foreign languages.

Similar demands are no doubt still presented to the Schools, but the Authorities, especially since the issue in 1919 of the Board of Education "Memorandum on Commercial Instruction in Evening Schools," have been adopting wider conceptions of the possibilities of evening education for office workers: and some progress has been made in the direction of supplying the needs of other kinds of persons concerned with commerce.

Some important general circumstances.

3. Most commercial employees in England and Wales begin business life at the age of 16 or earlier. So far as concerns those who have been educated in grant-aided schools, only a few have received some commercial instruction as part of the curriculum. Secondary schools and advanced kinds of public elementary schools are for general rather than vocational training, and commercial instruction, if provided at all in such schools, is introduced in a limited measure only, and not before the age of 13 or 14. Junior commercial day schools, however, draw their pupils from the ordinary public elementary schools at about 13 or 14, and those who enter them definitely intend to enter business life. The whole curriculum of such a school, though only to a limited extent specialised, can, from the outset, be based upon the common vocational aim of the pupils. Even in these schools the special training which is given is necessarily of an elementary character.

5. In these circumstances part-time instruction, such as can be attended concurrently with business employment, must for the time being be an important branch of the public provision of commercial education: numerically considered, it is of preponderating importance in the whole system.

The early development of this branch of education owed much to the work of the Royal Society of Arts as the leading examining body concerned with commercial studies. School Boards, Technical

Instruction Authorities, and the Local Education Authorities for Higher Education have successively taken up the task of providing instruction. But the examinations of the Society of Arts and of other bodies, including the London Chamber of Commerce, the institutions concerned with the commercial professions and the local Unions of Institutes, still influence through their syllabuses the character of the provision. The advisory collaboration of employers with school authorities, has, for various reasons, been rarer in connection with office employment and other commercial occupations than with factory, workshop and other industrial occupations.

6. A minority of recruits to business life are taken at 17 or 18, and later. Of these entrants many, no doubt, enter in privileged ways not open to the ordinary candidate for employment, however competent he may be. It would seem that those who want recruits in business establishments at the age of 18 are less convinced than those who take recruits at a like age into production that a special scholastic training is useful. Such an attitude is not surprising. Many successful business men began business life at an early age, and some in a very humble capacity. It is no doubt true to-day, as in the past, that competence in business affairs depends very largely upon characteristics of personality (whether these be natural endowments or acquisitions through education, social surroundings, and so on), such as mental and physical energy, imagination, pertinacity, quick wits, cool judgment, good manners, and so forth. No doubt certain attainments, if not indispensable, are a great help, such as a reasonably wide fund of general information, a sound knowledge of at least one modern language, and some facility in office arts. But of these attainments only the last cannot be obtained in any good secondary school. Beyond this a large amount of specialised information must, no doubt, be acquired for constant use by every person who holds a position of considerable responsibility. But much of this will be special to the particular kind of business, or even to the individual establishment. It may have been assumed, rightly or wrongly, that little of what might be learned in any kind of school about matters which concern those who have to direct commercial affairs would be practically useful to the beginner, or that such economic studies as a full-time pupil could make before the age of 18 would have no application in business practice.

7. Neither in public commercial schools and technical schools with commercial departments, nor in secondary schools, is there a large specialised provision of day instruction for pupils of 16 to 18 who are thinking of business careers. In a few of the London and Middlesex secondary schools there are, for pupils who have passed the first schools examination (normally taken at 16), advanced courses in which geography in its commercial and economic aspects is a leading subject. But the studies

in these courses are largely determined by the syllabuses for Group E of the University of London Higher School Certificate, or for the intermediate examinations of that university for the degree of Bachelor of Commerce or Bachelor of Science (Economics). Many of the pupils want to proceed to the university, and some, no doubt, aim rather at teaching than at business life. Full-time courses for ex-secondary pupils are provided in the commercial schools or departments of technical schools in some, but not all, of the greater business towns. Of the not very large aggregate number of students in such courses rather more than one half are girls, who are probably thinking rather of superior office work as an occupation for a few years than of the attainment of executive or directive posts in commerce.

8. Educational opinion, not to speak of business opinion, is not united on the question whether boys who hope for a career in commerce would be well advised to spend one or both of the years from 16 to 18 in special studies before entering business. One opinion is that, given the support of the business world and the possibility of giving a realistic as well as an academic quality to the training, such a preparation would be a valuable asset to a capable boy. He could be given a preliminary training which would render more fruitful the business experience which awaits him. He could extend his knowledge of at least one modern language as a medium for commercial intercourse and could obtain a useful acquirement in the office arts. Another opinion is that, while a scholastic study of general business affairs would be profitable, it would lack reality unless the boy were concurrently engaged in a business occupation. In this view the ideal plan, if it is attainable, is part-time day study concurrent with employment, or full-time study alternating with full-time business experience on the "sandwich" system. Still another opinion is that, for the commercial side of productive undertakings, a training which includes some study of the technics of production is highly advantageous; and in support of this view it may be mentioned that young men trained as engineers are occasionally employed on the selling side of engineering undertakings. On the other hand it is commonly held that there is a great deal of business for which, if boys of 18 are recruited at all, it may be difficult to do better than take boys with the necessary personal qualities (including an interest in business affairs) who have creditable records as pupils in good secondary schools which keep a reasonable proportion of the pupils till 18. Sometimes a brief and intensive study of the office arts, such as can be made in the private schools of business training, would be indispensable, but this can be taken if and when wanted.

The Character of Commercial Instruction in Full-time Schools.

9. In some advanced public elementary schools instruction in book-keeping, shorthand and, less frequently, typewriting and office routine is introduced in the third and fourth years of the course,

i.e., for pupils of about 13 and over. This instruction occupies from 4 to 6 hours per week, and time is found for it by discontinuing one or two of the ordinary subjects, or reducing the time given to several of them.

10. Some secondary schools introduce commercial subjects for certain of the pupils who expect to leave at 16 for business. Book-keeping can be, but very seldom is, taken as a subject in the first schools examination; as a rule, commercial instruction is taken only by pupils who are not likely to take that examination. It consists ordinarily of training in routine processes occupying from 4 to 8 hours per week, the normal curriculum being adjusted by omissions or curtailments.

11. In a number of large towns boys and girls who want to enter business at about 16 can proceed at or near the end of the ordinary public elementary school course to a junior commercial school with a 2 or 3 years' course. The competition for entry to such schools (in which quite low fees are charged) is often very keen, and some of those who fail to secure admission go to private schools, where higher fees are charged. The curriculum is not excessively specialised, and subjects like English, one foreign language, arithmetic, geography, history and physical exercises are commonly included. Science, drawing, singing and (for girls) cookery and needlework are taught in some schools. The commercial instruction, which occupies from 6 to 10 hours in the week, includes book-keeping, shorthand, in some cases typewriting, and the elements of commerce, a subject meant to provide, in an elementary way, an ordered survey of the organisation and processes of commerce, and to give a concrete meaning to the teaching of book-keeping, arithmetic and geography. These schools have naturally a limited objective. But they are apparently successful in doing what they profess to do for the pupils. Their education is continued, an intelligent interest in business affairs is developed, and they become competent to take up satisfactorily the duties which may be entrusted to them on entering business in junior posts. In the school year 1924–25, 31 junior commercial courses were provided in England and Wales, with an enrolment of 1,549 boys and 2,314 girls.

12. In those secondary schools offering advanced courses in which geography is a leading subject, economics, history and one or two modern foreign languages are generally elements in the curriculum. No stress seems to be laid upon office arts, though opportunity to study shorthand is sometimes offered. In the study of any foreign language attention is usually given to the economic aspects of the regions in which the language is spoken, and commercial terms and phrases are also noticed. But the demands of the University examinations to which the courses are directed naturally influence both the choice and the treatment of the subjects taken. The aggregate number of pupils in such courses is quite

small; the number who complete the second year in all courses may not exceed some 50, and of these not all go straight to business. In a few girls' secondary schools pupils who have passed the first schools examination can continue for specialised commercial studies.

13. The higher full-time courses (as distinct from the courses of junior commercial schools) in commercial schools and departments are generally planned for pupils educated in secondary schools till the age of 16. Some of these courses are of one year's duration, some of two years', and one or two are normally of three years' duration. The pupils do not drop subjects like English, history, geography, and mathematics, though these are naturally treated with a certain bias. More importance is given than in the junior schools to foreign languages; and the study of the clerical arts, if such are taken in the courses, is more intensive. The descriptive survey of the organisation of commerce is more detailed and is often supplemented by a study of general economic theory, and of the elements of commercial law. In several of the courses there are more girls (who are probably preparing for clerical posts) than boys. In the school year 1924–25 sixteen senior commercial courses were provided in England and Wales, with an enrolment of 212 boys and 333 girls.

Part-time Commercial Education: Clerical and Professional.

14. This is provided, to a large extent, in grouped courses of study, occupying about 6 hours (3 evenings) during each week of the school session. Normally the session covers 27 to 30 weeks of term in each year, but occasionally there are opportunities for a less extensive study in the summer term. The courses fall into three main groups:—

(i) junior, for young persons who have left the elementary school at 14. These usually extend over two sessions;

(ii) senior, planned for young persons who have completed junior courses and for those who have passed from secondary or junior commercial schools into business life at 16, but also attended by older students. These extend usually over 2, and sometimes over 3, sessions;

(iii) advanced, for older students.

In addition, there is for older students a considerable amount of less highly organised study.

In the London day continuation schools, which are mainly attended by young persons who have not had employment and are able to come on five half-days a week, there is a substantial amount of instruction to meet the requirements of those who want commercial employment. It is of junior standard.

15. In the junior courses, English and arithmetic are the chief subjects, and in some places geography is included. Some definite vocational training is commonly provided, shorthand, or book-keeping, or both, being the usual element of this kind. The teachers are, as a rule, employed during the day in public elementary schools, though persons in office employment are sometimes preferred as teachers of shorthand and book-keeping. At the end of such a course the young person may be expected to have an elementary knowledge of shorthand (as a rule, Pitman), and of the elementary principles of double-entry book-keeping. But this knowledge is not adequate for practical uses and requires further development in senior courses. Instruction of this junior standard is abundantly provided in most towns, large and small.

16. Senior courses, planned for students of 16 to 18 or 19, are, in the smaller towns, normally provided in one school only, which is, as a rule, the local technical school. In the larger towns they may be offered in two or more schools, and sometimes in schools concerned with this type of instruction and no other. London naturally requires an extensive provision of such courses, and there are some 25 (senior) commercial institutes, which enrol each year large numbers of individual students. The smallest of these enrols nearly 500; the largest enrols more than 2,500. These institutes are generally housed in premises fully occupied during the day by public elementary schools, and little day instruction can be provided. London requirements are supplied also by the City of London College (which is concerned solely with commerce), by the commercial department of the Regent Street Polytechnic, and to a small extent by a few other institutes having commercial sections. In large towns separate senior courses can sometimes be run respectively for students previously instructed in junior evening courses and for students from secondary schools. Students of the second class have reached a higher educational standard, but often have still to begin the strictly commercial subjects.

17. As many adults attend the schools for older students, there is naturally a substantial amount of single-subject study on the basis of attendance for one or for two nights a week. For students between 16 and 18, grouped course study on the basis of three nights a week is generally encouraged by School Authorities. A variety of grouped courses is often offered within the same school; thus in the London Commercial Institutes there are three main courses which differ from one another according as Shorthand, Book-keeping, or a modern language is the chief subject in the fixed part of the course. In the courses recommended for the several categories of students the strictly vocational subjects would not as a rule occupy the whole of the students' time, since it is desired to encourage a wider rather than a narrowly circumscribed interest in business affairs. In the teaching of Book-keeping the general aim is to supply an understanding of the

principles by which accounting is conducted, as distinct from a bare mechanical proficiency in the use of books of account. In many of the more important schools instruction is now offered in a subject, described sometimes as Theory and Practice of Commerce, sometimes as Business Economics, which is meant, as regards the general run of students, to create an interest in the wider aspects of business affairs, and, as regards the more ambitious students, to lay the foundation for further or more specialised studies. In these schools a grouped course embracing Business Economics, Commercial Arithmetic, Book-keeping, or two of these and often Shorthand or a modern language, is commonly offered. In London, courses of this type do not yet attract many students, but in some of the northern industrial towns it has become the normal practice for senior students to take grouped courses of 6 hours a week which, whatever their other commitments, include Economics as a fixed subject.

18. Advanced courses are found only in the more important of the commercial schools and departments. These are highly specialised and planned as a rule for students who have not been in senior courses, which are normally attended by ordinary office employees. Most of the advanced courses are based upon the requirements of professional bodies, and are taken by candidates for professional qualifications. There are courses for students who wish to pass the examinations of (i) the Institute of Chartered Accountants, the Society of Accountants and Auditors, or some other association of accountants ; (ii) the Institute of Bankers ; (iii) the Chartered Insurance Institute ; (iv) the Institute of Transport ; (v) the Chartered Institute of Secretaries ; (vi) the National Association of Local Government Officers, etc. The majority of such courses include, in addition to the technique of the particular branch of work in question, instruction in economics and the more relevant parts of commercial law. These subjects are perhaps as typical of advanced courses as book-keeping and business economics are of senior courses.

19. The figures given on pp. 175–6 show the extent of the provision of evening or other part-time classes in subjects which interest commercial students.

Part-time Commercial Education : Trading.

20. Although the main provision of part-time instruction has been made to meet the requirements of clerical employees and of persons engaged in occupations organised on the professional basis, some attempts have been made to provide courses more directly bearing upon large trading operations. The students whose needs have been

considered include those engaged in merchanting houses and those engaged on the commercial side of manufacturing :—

(*a*) In connection with the cotton trade and with cotton manufacture, the following instances are worth notice :—

(i) At the Royal Technical College, Salford, there is a course on the Manchester trade, limited to students over 21.

(ii) A buyers' and secretaries' course of two years is held in the Bolton Technical College.

(iii) A mill secretaries' course is provided at Oldham.

(iv) The Union of Lancashire and Cheshire Institutes has recently introduced an alternative senior commercial course in which cotton spinning or cotton weaving takes the place of one of the elective subjects of the ordinary senior commercial course. This alternative course is being attempted in the technical schools at Burnley, Chorley, and Stockport, but as yet the numbers of students are small.

(*b*) In the Bradford branch commercial schools wool and top merchanting courses were begun in 1915, and have been well taken up. The subjects taken are commodities and manufacturing processes, mathematics, and a commercial subject or a modern foreign language. Quite recently arrangements have been started for carrying instruction of this type to a higher stage in the commerce department of the Bradford Technical College. Courses of a similar type, dealing with woollen cloth, are held in the Leeds School of Commerce.

21. The advantage of vocational instruction is now recognised in connection with certain branches of retail trade. The Institute of Certificated Grocers, for example, and the National Federation of Meat Traders' Associations encourage young persons engaged in the trade to obtain instruction in, among other things, the commodities which they sell, including the legal regulations affecting the trade and the commodity. At the Smithfield Institute (London) special provision is made for students in the meat trade.

A scheme of training has been arranged at the Marylebone Day Continuation School, London, with the co-operation of the United Dairies (London), Ltd., for girls selected to enter the shops of the company either as saleswomen or as book-keepers.

In the Horseferry Road Day Continuation School, Westminster, a day course has been arranged in co-operation with the Retail Distributors' Association. Admission is by selection, in which a representative of the Association takes part ; and offers of employment in high class retail trading establishments are normally forthcoming for the pupils who complete the course creditably. The subjects of instruction include merchandise (dress goods, leather goods, pottery and glass, stationery) ; the technique of selling ; colour and design ; history and geography of commerce ; and business training.

Instruction is given by the regular staff, and occasional lecturers, including business men, visit the school. Demonstration sales are conducted, and the teachers spend a short period in a store each year.

In Manchester arrangements have been made whereby young persons selected for apprenticeship to the grocery and drapery trades respectively receive special instruction in day continuation schools.

Attempts have been made to provide instruction for persons engaged in retail trading in goods of artistic quality. At the London County Council Central School of Arts and Crafts a course (two mornings a week) was held for young persons, attending in their employers' time. The instruction was to cover two years; half the time in each year was to be given to a study of materials and manufacture from the retailer's point of view, and the rest to such matters of concern to the salesman as drawing, lettering and ticket writing, the relation of distributor to producer and customer, shop architecture, advertising and publicity. Short evening courses for store employees have been successfully held in 1925 and 1926 at the Barrett Street Trade School, London, in such subjects as textiles and window dressing.

The North Eastern Federation of the Furnishing Trades have encouraged the starting of evening courses for young persons engaged in the trades.

Detached lecture courses of a general character on salesmanship and advertising are provided in London and other large towns; but it is not clear that there is as yet much demand for this type of instruction. In Leicester and in London lectures for salesmen in the boot and shoe trade have been arranged.

22. These experiments and others of a like character, whether successful or not, are of some significance, since they indicate a genuine desire to meet if possible the vocational needs of other sections of the commercial world than the office workers for whom the older forms of commercial education are primarily designed.

Special Features of some Leading Schools.

23. The Manchester High School of Commerce provides, besides a junior commercial school, arrangements for two years' full-time study by ex-secondary school pupils. One combination of subjects is planned for those who wish to be foreign correspondents or foreign representatives of English business houses. Young business employees can attend at midday for language study. In the evening department of the school, which is planned for students of 18 and over, language teaching (including Chinese and Arabic) is developed to an exceptional extent. There are also lectures on the economics of various regions of the world. Other features are the courses arranged in co-operation with the Institute of

Transport, courses dealing with the cotton trade and its markets, and lectures on social problems. The study of industrial administration is provided for in the Municipal College of Technology.

24. The Liverpool School of Commerce provides instruction in Italian, Russian, Portuguese and Arabic. Two important lecture courses are arranged for the 1926 session, one dealing with the shipping industry, the other with the cotton industry. There are mid-day classes in languages for business employees.

25. At the Bradford Technical College there is a part-time day course in the Department of Textiles designed for persons engaged in merchants' offices. In the evening department of commerce and banking a start has been made with advanced merchanting courses dealing with yarn and cloth respectively. The courses are intended to carry to a higher stage, and under more advantageous conditions, the merchanting instruction which has for some years been given outside the college in senior courses.

26. Attempts are being made at Birmingham to widen the scope of the evening school of commerce within the possibilities of the accommodation, which is only available for evening use. Courses were arranged in the autumn of 1926 in co-operation with the Institute of Transport, and courses were also proposed for persons engaged on the commercial side of the rubber industry.

27. In the department of commerce in the Leicester Municipal College of Technology, some commercial instruction is included in the one-year courses for boys intended respectively for the boot and shoe and the hosiery industries.

28. In the department of commerce in the Cardiff Technical College the features of special interest are the evening courses for railway clerks, for shipping and chartering clerks, and for colliery clerks.

29. The City of London College has a full-time day course for boys and girls of 14 and over. This can be followed for four years. Among the subjects studied are mathematics and elementary statistics, the science of common things with particular reference to commodities, history and geography with special reference to commerce and industry, economics, commercial law, the theory and practice of commerce and the usual office arts. Provision is made also for students who may be anxious to occupy by specialised study the interval between leaving a secondary school and entering business at 18 or 19. A special feature of the evening department is the instruction concerning commodities for which there are markets in London. The subjects dealt with so far are cereals, iron and steel, oils and fats, the marketing of eggs, timber, textiles and the Mincing Lane commodities.

30. In the commerce department of the Regent Street Polytechnic, London, there is, besides a junior commercial school, a senior full-time course planned to occupy two years for students who

are not less than 16 on admission. Provision is made by means of optional subjects for a variety of needs, including those of candidates for University examinations. In practice it is found difficult to retain students for two years. A special feature in the evening work is a course in industrial administration.

The Bearing of University Courses on Schools under the Board of Education.

31. The examinations of the University of London for external candidates for degrees in commerce and science (economics) attract a few ambitious students in the larger and better staffed commercial schools and departments and in a handful of secondary schools. But the instruction given within University Departments of Commerce has no organic relation with the distinctively commercial instruction which is supervised by the Board. Students in the University Faculties of Commerce enter normally after a secondary school education carried up to or beyond matriculation standard, and very few have made any specialised commerce studies before leaving school. On the other hand the universities indirectly influence commercial education because graduates in commerce or economics are now commonly employed in the more responsible posts in commercial schools and departments under the Local Education Authorities.

Summary and Prospects of Development.

32. The following conclusions on the subject of commercial education as it exists to-day seem to be justified :—

(i) Junior commercial schools (full-time), like other schools which give a two or three years' specialised preparation for entry to employment at or about 16, seem to be successful. The discipline and experience supplied by the schools probably give the pupils both (*a*) an interest in business, some understanding of the place in business as a whole of the particular function for which they are first engaged, and a disposition to take pride in efficient work, and (*b*) a measure of competence in the office arts which makes them at once useful to those under whom they work. The extension of this type of preparation for business depends upon a combination of circumstances ; the authority must be satisfied that it is worth while, rooms which are suitable for the purpose and not already wanted for other uses must be at hand, and the Board of Education must be ready to contribute to the extra expenditure in prospect.

(ii) The professional organisation of an occupation connected with business stimulates a demand for education, if only for the purpose of satisfying professional requirements.

(iii) In some schools instruction is provided with a view to assisting persons engaged in wholesale trade, and some special courses are offered in textile towns for the benefit of persons engaged on the commercial side of manufacturing undertakings.

(iv) Increased attention is being given to the educational requirements of young persons engaged in retail trading. Generally there is co-operation in this connection between the authority concerned and some trade body.

(v) For girls at least there seems to be a good case for a post-secondary full-time training of one year's or two years' duration in preparation for superior clerical functions.

(vi) Evening training for office workers has always been in great demand and there is, as a rule, no great difficulty in extending the provision, since much useful instruction can be given in ordinary classrooms and lecture rooms used in the day for other educational work. It is difficult to obtain positive evidence about the extent to which and the ways in which the commercial schools are actually contributing to efficiency in business life. But as the instruction is so much in demand students must find this kind of study profitable to themselves, and there is a strong presumption that commercial interests also are being served. Attendance is normally after a full day's work, much of the teaching is given by persons who are either not teachers by profession or, if they are teachers, have rarely any business experience, and the full-time education of very many students has ended at the age of 14. Within the limits implied by such conditions the arrangements are reasonably efficient, and excellent results in the case of individual students are to the credit of the schools. School authorities generally expect the junior students (those under 16) to study English and Arithmetic even if they find it necessary to offer instruction in Shorthand, and some of them also emphasise Geography. Efforts are being made by most authorities in agreement with the suggestions of the Board of Education to induce older students to address themselves in larger numbers to more liberal studies in connection with commerce, and this movement is supported by influential examining bodies. Among the factors which will determine the rate and quality of progress in this direction is the available supply of teachers who are competent to undertake the desired kind of teaching. Such teachers must not only have had opportunities of making a sufficiently scientific study of commerce, they must also acquire skill in presenting their subject to young persons whose interest in the study will be more often practical than scholarly. Teachers of a suitable type are generally to be obtained for the schools in the greater commercial towns, but there are many other schools where the provision of higher teaching, though desirable for some students,

may for some time to come be difficult to arrange. The figures given on p. 176 show that of the distinctively commercial subjects Bookkeeping and Shorthand are much more in demand than any others. The amount of instruction in these subjects will always be large, for evening commercial schools will always have to take account of persons who want, and may perhaps need, little more than the opportunity of acquiring an intelligent proficiency in the specific activities of the office. But a growth of work on a higher plane such as would be reflected in larger numbers of classes in Business Economics, in Geography, in Commercial Law and in Spanish is much to be desired. Rapid progress in these directions is hardly to be expected unless new influences are brought to bear on the students; but even in the existing circumstances some progress can be reported.

33. The most interesting questions connected with commercial education outside the universities seem to be these—

(*a*) Is there a good case for giving to boys who have been to secondary schools up to 16 and hope to enter business life at 18 or 19, a full-time preparation which aims at supplying a wider intellectual outlook over business affairs, rather than a narrower accomplishment in the mechanical arts used in business?

(*b*) Is it possible for the commercial schools and departments to be of service to men of good education already in business who undertake, or aspire to undertake, wider responsibilities?

34. It is evident that the authorities responsible for each of the greater schools want to make them as serviceable as possible to the mercantile community. There can be no doubt that close relations with any local organizations which can express the opinions of business men are desired both by the governing bodies and by the heads of the schools and departments. The heads of the greater schools are now for the most part men qualified, at least by academic training if not by responsible business experience, to take a wide view and to appreciate the practical considerations which enter into such questions as those put in the preceding paragraph. Experiments are being made in most of the important towns, but the heads are the first to recognise that local considerations must very largely determine what is intrinsically desirable, and how far it is also practicable. It is, however, not sufficient that schemes of instruction should be well conceived and skilfully worked out. Students must believe that some part of their leisure will be well spent in study, or that it will be worth while to postpone immediate employment in order to get a broad view over business affairs. Some will arrive at these conclusions on their own initiative, others may not be persuaded unless it is clear that employers individually and collectively believe that better education and specialised education are, other things being equal, real assets to a business man.

35. It would not be pretended by anyone that commercial schools can do more than prepare the way for, or supplement, that practical skill which is acquired in relations with business men and the handling of actual business affairs. But if it is the case that, in these times, practical skill as a trader needs reinforcement by some general acquaintance with the leading forces and tendencies which are believed to affect commerce in general, or that a young worker in commerce cannot without systematic and properly directed study get all the knowledge even of his own line of business which he could put to a practical use, or that some training in the use of whatever current commercial intelligence is to be had will be advantageous, then it is probable that the commercial schools could be of assistance. The best security for the utility of commercial education will be a thorough discussion of problems and conditions, in all their aspects and bearings, between school authorities and men able to represent local business needs. In this way school authorities would be able to appreciate business values, and business men could form better judgments respecting the limits within which school efforts are necessarily made. The need for the main existing types of commercial education is not likely to be called in question. But thorough-going local discussions might disclose that special needs are not yet adequately met, and might indicate that some new ventures are both desirable and practicable if the support of business interests is forthcoming.

(ii) Commercial Education in the Universities and University Colleges of England and Wales.

(*Based on replies to a questionnaire which was sent to the Universities and University Colleges mentioned in the first paragraph.*)

Specific training for business in the universities and university colleges is a modern development, the earliest faculty of commerce being that which was organised in Birmingham University in 1901. Facilities for training are offered by the universities of Birmingham, Durham (Armstrong College, Newcastle-on-Tyne), Liverpool, London, Manchester, and Reading, and by the University Colleges of Nottingham and Southampton. It is only in Birmingham, Liverpool and Manchester that faculties or departments of commerce were founded before the war.

The training is provided by means generally of three-year courses, subsequent to matriculation, leading to the B.Com. degree or to a diploma in commerce. The M.Com. degree is given in Birmingham, Liverpool and Manchester after one or two additional years' study. The London M.Com. degree is only given if the candidate has had practical commercial experience approved by the University extending over a period of not less than two years after passing the B.Com. examination. At Armstrong College the diploma is given after two years' study. In Reading the certificate in commerce

is given after a course lasting one session, and a diploma after a second session. A one-year course is also provided in preparation for the college "certificate in secretarial subjects." In Manchester the "higher commercial certificate" is granted to students who have completed about two-thirds of the course required for the B.Com. degree. In addition to their own diplomas, Nottingham and Southampton both prepare students for the London B.Com. degree.

All these courses are intended in the first place for whole-time students, but in some cases arrangements are made so that some part or the whole may be taken by candidates for degrees who are already employed and can only study, or complete their studies, in the evenings.

At the London School of Economics all the more important courses for the B.Com. degree are given (by the same professors and lecturers) both in the day and in the evening. The evening students are usually those engaged in regular work in the daytime. It is found that each year more and more students take the intermediate examination either at school or as day students in the university, and then, entering business, complete the final as evening students, thus earning their living while completing the degree. The degree is not limited to those students who can attend at the School of Economics; students living in any part of the world can read for the degree as external students of the university, taking advantage of the help provided by the Commerce Degree Bureau.

Another method adopted to meet the case of those who cannot give whole-time attendance is to allow the attendances required for the various examinations to be spread over an extended period. At Liverpool, however, where this facility is offered, there has been no demand for it. Birmingham candidates who are unable to devote the requisite time to study in the university for the M.Com. degree may receive permission from the Faculty to submit service in commerce or industry (or in an approved teaching post), extending over not less than two years, in lieu of the year of attendance in the university; they must, however, like other students, present a thesis on an approved subject, and submit to an examination on the general field within which it falls.

The Character of the Instruction.

In general the aim is to give the student a broad training calculated to fit him for public and commercial life, and instruction in special subjects, selected, as a rule, because of their connection with the career which he proposes to take up. First year students are generally given instruction in such subjects as commercial and industrial geography, elementary accounting and economics, currency, banking, and one or more modern languages. During the second and third years the instruction in these subjects becomes more advanced, and other subjects such as transport, commercial or industrial law, or public finance, are added. The group system in the

final stages of the London degree is interesting. The syllabus for the degree covers three years, the intention being that the course should develop from broad, general principles in the first two years to specialisation in the third year. The syllabus of study was approved by committees representative of the main business interests concerned, and the special groups for the third year were drawn up by sub-committees, which included prominent men in the particular trades. The course is divided into three parts—the intermediate, the Final Part I, and the Final Part II—and thus normally each part is taken at the end of its representative year. The intermediate, however, can also be divided into two parts and spread over two years, a procedure generally adopted by evening students making the whole course a four year one. The London syllabus is now as follows :—

The *Intermediate* (normally taken at the end of the first year) :—
I.—Elements of Economics.
II.—Geography.
III.—An Approved Modern Foreign Language.
IV.—English Economic History.
V.—Accounting, *or* a subsidiary approved Modern Foreign Language.

The *Final, Part I* (normally the second year's study) :—
I.—Present Organisation of Industry, Banking, Trade and Transport.
II.—Modern Economic Development of the Empire.
III.—Elements of Commercial Law.
IV.—Statistical Method.
V.—One of (*a*) An approved Modern Foreign Language.
(*b*) History.
(*c*) English.
(*d*) Art in relation to Commerce.
(*e*) Psychology.

The *Final, Part II* (normally the third year's study).

The student now definitely specialises in a particular group, which can be selected from any one of nine options, each group covering four or more subjects, including in all cases an English essay and a modern foreign language. :—

(*a*) Banking and Finance.
(*b*) Trade—Colonial and General or Distributing.
(*c*) Trade of a Definite Area (e.g., Brazil, India, &c.).
(*d*) Industry.
(*e*) General Transport.
(*f*) Shipping.
(*g*) Inland Transport.
(*h*) Public Utilities.
(*i*) Art in Relation to Commerce.

Technological Courses for Commercial Students.

Provision is made in almost all the institutions dealt with in this Section for commercial students to take technological courses, and for technological students to take commercial courses. In Birmingham, for example, students in commerce who expect to be engaged in the commercial conduct of manufacturing and similar businesses may devote as part of their degree course about a quarter of their time to work in applied science. Applied science students are likewise offered facilities to take commercial subjects as an undergraduate study, and in certain science degree curricula it is a requirement that one or more commerce courses must be attended and examinations passed before the student may take his B.Sc. degree. Graduates in engineering, mining and metallurgy of the University of Birmingham, and other approved graduates of that or other universities, may complete a one year's course of study in commerce subjects leading to the graduate's commercial diploma. In Liverpool the fourth year engineering students have to attend six commercial lectures as part of the course. In Nottingham a student preparing for industrial life can spend up to a third of his time in the technological departments of the college. Special arrangements have also been made for the students in the textiles department to spend about one-third of their time taking commercial courses.

The London School of Economics does not provide any technology courses subsidiary to the main teaching for the commerce degree.

Generally speaking, it appears to be the case that commercial students do not very often take advantage of the facilities offered them in the way of technological courses ; but that, on the other hand, the technological students are sometimes required to take commercial subjects, and sometimes elect to do so.

Supply of Instructors.

Certain difficulties have been recently experienced in obtaining teachers with specialist qualifications in some of the newer branches (e.g. statistics and transport) into which economics and allied subjects are tending to divide. Otherwise there is no lack of duly qualified persons. In this, as in other spheres of activity, however, it is difficult to find the outstanding personality, or the individual uniting within himself in an unusual degree the qualities required.

Professor Dewsnup, Chaddock Professor of Commerce in the University of Liverpool, has informed the Committee that the number of persons with academic training in economic theory and the principles of commerce is increasing steadily, and although only a few of these are adaptable to university teaching, the supply is distinctly greater than in pre-war days ; but it is still impracticable, he considers, under existing conditions to secure the ideal type of

lecturer or professor who combines distinction in appropriate academic studies, a strong personality and a flair both for teaching and investigation, with experience of a responsible nature in connection with business undertakings. In the University of Liverpool, when it came to appointing lecturers in commerce, business experience of any value was found to be unobtainable; the authorities therefore deliberately chose first-rate ability in preference to third-rate experience. "That the nature of the work done by the universities in preparing men and women for business careers is affected by these conditions goes without saying," Professor Dewsnup continues. "One must not expect from the average university lecturer in commerce any great intimacy with the routine details of actual business transactions. Whether 'practical' business is capable of being taught in the classroom or not, it is certain that the ordinary university lecturer cannot in general be looked to for the discharge of such a duty. If he be forced to attempt it, the result is likely to be a somewhat unreal representation of business activity. What he can do is to describe the play of forces as seen by a highly intelligent and critical onlooker, the functioning of organisation, legal and economic relationship, underlying economic influences and tendencies. The training he gives to his pupils is, therefore, rather of a 'theoretical' than a 'practical' nature. He may, indeed, give attention to specific fields, transport, banking, marketing and the like, but in such fields his competence lies rather in the analysing of general conditions and movements than in the exposition of the technicalities of particular transactions.

"Such training would doubtless be more effective if it could be given by skilled teachers combining a competent understanding of general principles with a wide and responsible experience of actual business administration but it is by no means ineffective when given by instructors with little or no routine business experience, provided that they are otherwise well qualified. Moreover, the type of teacher we have in mind absorbs very quickly a knowledge of the machinery of business, its agencies and documents, so that though unskilled in actual practice he is by no means ignorant of its organisation and methods. Furthermore, his work is supplemented by visits of inspection to industrial plants and to commercial and financial establishments (participated in by both lecturers and students) and by addresses delivered by business men. In addition, a certain proportion of our regular work is undertaken by practical men. The whole of our instruction in accounting (five to six hours a week) is so handled,* part of the course in business transactions and documents, and also the portion of the third-year course in 'Industry and Trade' that deals with the financing of foreign trade (the equivalent of ten lectures)."

* So also in Birmingham, where the Professor of Accounting has always been a practising accountant of high standing.

Supply and Quality of Students.

In the six universities and two university colleges dealt with, there are a few hundred students reading for commerce degrees, and a few hundred who take classes or read for certificates. The number of students has increased since the war, but there appears to be accommodation for more. In Armstrong College, where students of all kinds attending commercial classes amount to 43, the accommodation has never been fully taken up, except immediately after the war, when a scheme of grants for ex-Service students was in force. In Liverpool, where in the 1925-26 session the number of students was 36, about double this number could be accommodated under existing arrangements, with the addition of a tutor. In London the number of B.Com. students registered at the School of Economics in the 1925–26 session was about 280. In addition there are a considerable number of occasional students who take one or more of the commercial subjects offered at the school without registering or reading for a degree. The figures of the regular commerce students show a steady annual intake of about 100. This number equals that of the medical schools of the university in a normal year and is also equal to that of the B. Sc. (Econ.) enrolments at the school. In Birmingham the number of students in the Faculty of Commerce is about 60, all day students. In Manchester there are 180 reading for the commerce degree, divided about equally between day and evening. The classes in banking and railway economics are attended by 300 or 400 students.

As regards the quality of the students coming forward, the experience of the universities differs. In Birmingham and London there appears to have been a steady improvement. The first students who came forward at the School of Economics for the London Commerce degree were inclined to underestimate the work, and certain of these students (many of them ex-Service men in receipt of the Government grant) dropped out. Since the degree has become more widely known, however, and its possibilities realised, the type of student has steadily improved, though it has still to attract more students from the "Public" schools. The Faculty of Commerce in Birmingham now attracts its full share of the best students coming to the university. With regard to Armstrong College it is remarked that the trouble about the students is not that they are unprepared for business, but that they are often unprepared for the university; and Mr. Kenneth Vickers, Principal of the University College, Southampton, states that it is not always the best students who go in for the commerce degree. This, he says, is partly due to the fact that the degree is new, and its utility has still to be definitely proved, and partly to the fact that despite general statements there is not a widespread desire to employ university graduates in commercial careers.

Professor Dewsnup says that at Liverpool they find an increasing number of candidates for the B.Com. degree coming up with higher certificate qualifications. "But the school training of even these students," he writes, "does not always ensure easy adaptation to the commerce course in such subjects as commercial and industrial organisation, accounting and geography. In too many cases the youths coming direct from school tend to 'remember' rather than to 'think.' This is a difficulty not peculiar to the commerce courses of our universities, but it is apt to loom large in these courses because of the unfamiliarity of the pupil, when admitted, with the facts of our economic régime. I am inclined to think that this difficulty would be mitigated appreciably in the case of commerce students if there were established in our large cities real (sixth form) high schools of commerce, into which pupils intending to enter business (directly, or indirectly through a university) might be passed from the fifth form upon obtaining a school certificate. Such schools, adequately staffed and equipped, working in close relation with their neighbouring universities, with a two years' curriculum based on two modern foreign languages, mathematics and statistical method, geography and modern history with special reference to their economic aspects, economic organisation and accounting, would be most helpful in feeding suitably-prepared candidates into the university departments and faculties of commerce, to say nothing of their value to business directly. Many boys who now spend two years in the sixth form over a conventional programme of studies before going into business would derive large benefit from the training and associations of these schools."

The commerce course at Liverpool is a much heavier one than in pre-war years; and the university has taken pains to spread the knowledge of this, in order to discourage in advance those who might be inclined to regard it as an easy way to a degree or other qualification.

Very few women, so far, have taken the Commerce degree. Most women pass into commerce through the secretarial side, or through retail distribution.

It should be mentioned that a small, and perhaps decreasing, proportion of full-time day students for commerce degrees consists of Orientals and foreign Europeans.

Scholarships or Other Financial Aid.

There are one or more scholarships open to those who intend to take the commerce courses at all of the universities and university colleges dealt with, and the commerce candidates are also eligible for a number of entrance scholarships open to arts and science students in general.

When the B.Com. degree courses were first started in London it was resolved that travelling scholarships should be instituted as an important part of the scheme, and, following the generous offer by the Cassel Trustees of £1,000 a year for scholarships, it was arranged that their donation should be devoted to the foundation of four travelling scholarships of the value of £200-£300 per annum, to be distributed as far as possible equally between internal and external students. The scholarships are open to students who have passed the Final, Part I, and wish to pursue abroad a course of study in preparation for the Final, Part II, which must be taken within two years of the award of the scholarship. There are several other travelling scholarships, together with entrance scholarships and free places, offered by the school to students who wish to take a commerce degree.

Co-Operation by Commercial Interests in Planning Scheme of Facilities, etc.

In most of the institutions dealt with in this Section there are means of consultation with commercial interests as regards planning the general scheme of facilities, and suggesting modifications in training; but it does not appear that co-operation in these respects is of any considerable importance, except in London and Birmingham. As has already been indicated, the degree course in London was instituted and the syllabus drawn up in close consultation with distinguished representatives of leading business interests; and co-operation with the business world is maintained by a special committee, which contains representatives of the more important branches of commerce. In Birmingham the curriculum for the B.Com. degree was drawn up in 1901-2 after prolonged consultation with a committee of the Chamber of Commerce. Since about 1909 there has been an Advisory Board (with changing membership), representing important business houses. It meets two or three times a year. It has long been the practice to lay the curriculum before this Board from time to time, and even the examination papers. All changes in the curriculum have been discussed with the Board. In this way the system of training has secured the respect of the business community. Much help is given to the students by firms which grant facilities for visits to and inspection of works, but this rarely teaches anything concerning the real problems of management and control. At other universities the means of consultation usually consists of a commerce advisory committee, and, in some cases, conferences are held from time to time with leading business men of the neighbourhood with the object of making the work of the institution as useful to the business community as possible. These committees do not, however, invariably function well, and there is some doubt as to whether such procedure is of any great value.

Nor does it appear that business firms in general co-operate with the universities to the extent of giving facilities to their staff for daytime university study, although, doubtless, many of them encourage their people to attend evening classes.

Some form of appointments board exists at all the institutions dealt with, and there is a certain amount of co-operation on the part of business organisations and firms in a few centres in the promotion of the increased employment of persons with university qualifications. In Birmingham, London, and Nottingham especially, business interests have co-operated in placing the students trained. The main appointments work of the University of London is now done in direct association with the University Commerce Degree Bureau (see next paragraph), with which the School of Economics and other Schools of the University work in close co-operation ; and this is supplemented by appointments work at the School itself, to which employers often apply direct. There is also a very close connection between students and staff, with the result that the school can give at any time complete and first-hand information with regard to the attendance, personality, and character of the students in so far as their life at the school has made these apparent. Experience has shown that this type of information is exactly what is wanted by employers, who place a very high value on the fact that it is given first-hand. Thus a sound connection with city firms is steadily being formed.

The University of London Commerce Degree Bureau.

The University of London Commerce Degree Bureau, which was opened at 46, Russell Square, on 1st March, 1922, is an essential part of the scheme for the higher teaching of commerce in the University. The Bureau is a separate institution of the University, not formally connected with the School of Economics, but as a matter of fact closely associated with it in many sides of its work. Nearly all the Bureau's educational staff are members of the staff of the School of Economics. Briefly, the function of the Bureau is a two-fold one. On its educational side it assists by means of pamphlets, study-notes, exercises, and individual guidance (all under the services of competent educational advisers) external students for the commerce degree, who for reason of residence or other cause are unable to attend regular classes at the School of Economics, or elsewhere. In most cases the students reside out of London, and where they do not do so they are not admitted as students of the Bureau except where it is shown to the satisfaction of the School of Economics that they cannot reasonably attend the day or evening classes at that School. In this way there is no over-lapping with the School of Economics, and on the educational side the Bureau may be regarded as doing work complementary to the School. In February, 1926, there were 156 students reading under the Bureau's direction.

The second main function of the Bureau is to give assistance and advice as regards employment to commerce degree students both external and internal, and with this work is associated the general appointments board work of the University by a special arrangement made with the Senate. The present secretary of the Bureau is also responsible for the University Appointments Board. A grant (at present at the rate of £750 per annum) is paid by the University to the Board of Governors of the Bureau in respect of the general appointments work. The Board of Governors endeavours to open out employment facilities for all graduates (men and women) who possess the commerce degree or are studying for it (as well as other graduates), collects information and reports as to openings and prospects of employment in the various parts of the world, and acts as a bureau of information for business firms as well as for students. Thus it forms a tangible link between the City and the University. In 1924, a special Woman Officer was appointed to assist Women Graduates to get appointments in business, industry and secretarial work, and to investigate new career openings. A nominal registration fee is charged to students, but there is no charge to employers. The London commerce degree students have been placed satisfactorily in business and industry in spite of the difficulties of the times. On this side of its work the Board has the assistance of an Appointments Advisory Committee, representative of the colleges and schools of the University, and a special link is maintained with the School of Economics through a member of the teaching staff.

Progress and Prospects of the Commerce Degree.

It appears from the replies to the Committee's enquiry that there is a growing acknowledgment amongst progressive employers of the value of a university degree in business. While as yet it cannot be said that there is any great readiness to give the university man preference—there is rather a diminishing reluctance to discriminate in his favour in the making of appointments—and while many business men still seem to be distrustful of a university education—an attitude doubtless reinforced by the great success in business of many men of limited school education in the past—there are certainly an increasing number of firms and organisations which definitely prefer university men ; though even in the case of those concerns which do take on men with the commerce diploma or degree, it is often found that the arrangements for their practical training are inadaquate, particularly in the way of securing to them the diversification of experience which they should be so specially fitted to take advantage of, and the absence of which so frequently damps their interest and lessens their efficiency. Those universities which have any considerable pre-war experience in the matter of the commerce degree testify to a more favourable attitude among employers in recent years as well as to an improvement in the quality of the

candidates. It is certainly the case that a very large majority of men who have qualified themselves at the universities have been able to obtain appointments, and this in spite of the trade depression but for which many firms might have been able to take a greater interest in the academic qualifications of their employees. Very many of the candidates who came forward in the years immediately after the war were, of course, ex-Service men of a somewhat high average age and broken education, but, with very few exceptions, these candidates were gradually absorbed, largely with the help of business men.

The following appreciation of the B. Com. degree by Professor A. J. Sargent, of the London School of Economics, taken from the Report on the Teaching of Commerce in the University of London, printed in July, 1924, is of interest :—

> " The commerce degree is so ' young ' that it is not possible to form any sound judgment as to its value to its possessor in after life. Though it has undoubtedly helped some individuals to a start in business, they have yet to make good, and their number is too small to form the basis of an argument. We do, however, know something of the effect of the training on the mind of the student. The degree at its inception certainly attracted some students of inadequate general education and with wrong ideas as to its character. They regarded it as a short cut to higher pay, a purely practical and professional qualification to be obtained in the easiest possible manner. They were inclined to criticise some of the courses or subjects of the syllabus as being of ' no use.' They failed to realise that they were members of a university, not of a technical school, and that the very subjects to which they objected were inserted deliberately to render the training a real education, comparable to that in other faculties in the university. This is particularly true of the work in the first and second years, the continuation of school, though even in the specialised third year the non-practical and scientific aspects of the subjects treated are far from being neglected. One of the hardest tasks of the teacher is to instil into the mind of the student the fact that he is being trained *for* business, in the widest sense, but not *in* business, and that it is the training that matters, rather than the memorising of some special groups of facts which can be immediately turned into cash.
>
> " The method of teaching is not the same throughout. In the first two years it is fairly uniform, and based largely on lectures. There is a certain ground to be covered, and little room for individual differentiation. In the third year, owing to the high degree of specialisation allowed, it is impossible to provide elaborate lecture courses for all. In fact, it is undesir-

able. There is more tutorial work, more personal contact with the teacher, but far less formal lecturing. The student is specialising with a view, more or less definite, to some career; in this sense his training is narrowed. On the other hand, he is compelled to read and think more for himself, and to show some initiative and stand on his own feet, with only general assistance and criticism from his tutor. He develops a certain amount of character and mental maturity, sometimes in great contrast with the purely 'absorbent' note-taking attitude which is common to the first two years Not infrequently, he reaches the stage at which he ventures to criticise or differ from his teacher. He has full opportunity for showing what he is worth as an individual, and the staff are enabled to form definite personal judgments on his capacity and character.

"Even at this, the latest stage, there is a tendency to over-estimate the immediate commercial value of the degree, to think that its possessor should be in some mysterious way exempt from the general rule of beginning at the bottom of the ladder. The corrective to this form of swollen head is to be found in the attitude of employers. Some, of the old-fashioned type, look merely for a well-trained machine at the lowest possible cost. Such have no use for a university graduate. Others, more modern in outlook, are fully alive to the value of higher education, but are indifferent to the label. They regard the training rather than the degree or the examination results. They lay stress on character, no less than on intellect; hence the value of the personal impression gained by the teacher in tutorial work. Even the most enlightened employer must face one difficulty, that of age. He wishes to catch his men young and train them in his own ways. The problem of the senior man was most grave during and after the demobilisation of the army. The graduate of the future will be younger, but still hardly young enough in the view of many employers. One solution of the problem is for an undergraduate to enter business at the end of his second year and complete his degree course in the evening, spreading it over two years. This is a procedure well recognised in connection with the B.Sc. (Econ.), and the commerce courses are carefully arranged to suit the needs of the man earning his living during the day. The man who has not enough grit to surrender his evenings for a year or two is hardly worth the degree, and is not likely to go far in business.

"A further difficulty encountered by sympathetic employers is the natural jealousy felt by those already in a business for the outsider who enters with the appearance of special advantages and privileges. The undergraduate is perhaps less likely than the full-blown graduate to excite this feeling, but

> its existence cannot be ignored, and any undue pride or lack of tact on the part of graduate or undergraduate will not only damage his own prospects, but will also detract from the value of the commerce degree in the eyes of the whole body of employers. The future of the degree is likely to depend not so much on the numbers and knowledge of its holders as on the success with which the true ideal of education and a reasonable humility is instilled into them in the course of their training."

The experience of the School is summed up by Sir William Beveridge as follows :—

> "The experience obtained seems sufficient to show that the degree has taken its place as an important and valuable part of the activities of the University of London. It has attracted a steady stream of students, sufficient but not overwhelming in numbers, and showing a steady advance from year to year in ability and previous training."

It should be added that one or two of the replies to the questionnaire raise the question whether a faculty of commerce serves any purpose which could not be served equally well by rearrangements within the faculty of arts ; and suggest that the whole position of the B.Com. degree as a preparation for a commercial career requires to be examined. Undoubtedly the technique of business has to be learned by experience, and it is a technique which is acquired without difficulty by a trained mind. Hence, if the value of a university trained man to the business world is in his trained intelligence and adaptability, it may be argued that these qualities are likely to be developed just as surely by a course in arts or pure science as by a specialised course in commerce ; and that, if the object to aim at is a combination of liberal culture with utility, the real value in commerce of the university graduate is not merely that he holds certain paper qualifications, but that, through the influence of university life, he has received all those other things which are so important in the equipment of a properly educated university man. From this point of view, part-time and evening courses are far less satisfactory than a full-time course. On the other hand, it may be maintained that while it is true that most of the work of a faculty of commerce could be done in a school or tripos of the faculty of arts, in the new universities the students would not have enrolled at all but for the offer of a direct training for business, which naturally brought with it a new degree. "B.A." had little or no prestige with business men : there was a chance of giving "B.Com." some prestige.

IV.—COMMERCIAL EDUCATION IN SCOTLAND.

(*Furnished by the Scottish Education Department.*)

Introductory.

1. The sections which follow will deal separately with the instruction in commercial subjects given in the primary schools, the secondary schools, the continuation classes, the Central Institutions, and the Universities of Scotland.

2. In the past the policy of the Scottish Education Department has been based on the view that pupils should obtain a sound general education in which neither the linguistic nor the scientific side is neglected. If there has been a recent tendency to facilitate, or even to encourage, the study of vocational subjects at school, the Department has not lost sight of its old aim, and no " vocational " course which is deficient on the cultural side can secure its approval.

3. As the result of changes introduced under the code of 1923, every pupil in a primary school has now a choice of three courses, provided the requisite teaching is available—one of two years, leading to the Day School Certificate (Lower), one of three years, leading to the Day School Certificate (Higher), and (if he proceeds to a secondary school), one of five or six years, leading to the Leaving Certificate of the Scottish Education Department. In each course the pupil may, if he chooses, include a group of commercial subjects.

4. Provision of the requisite teaching has been greatly facilitated by the Education (Scotland) Act of 1918, which substituted the county for the parish as the administrative unit. Under the old régime there were many cases in which it was impossible to satisfy the special needs of those pupils who intended to follow a commercial career. But the co-ordination and centralisation possible under the new conditions have removed much of the difficulty. Generally speaking, the new authorities have endeavoured to extend to the remoter parts of their areas the advantages provided in the more populous centres and, even where centralisation is not feasible, individual pupils or very small groups of pupils have now a better chance of receiving specialised instruction of this type in their own schools.

5. In some of the larger centres efficient, though uncertificated, teachers with experience of office work are employed ; elsewhere the work is done by ordinary certificated teachers who by specialisation in the commercial branches have acquired the requisite knowledge and facility. For those who intend to concentrate on the teaching of commercial subjects, courses of professional training are provided by the Edinburgh and Glasgow Provincial Committees, the normal condition for admission being the degree of Bachelor of Commerce or the Diploma of the Glasgow and West of Scotland Commercial College.

Primary Schools.

6. The extent to which the several education authorities provide instruction in commercial subjects varies considerably. It depends in great part on the extent of the demand, and the extent of the demand depends on the nature of the main occupations in the area or in the areas easily accessible.

7. Of the pupils who were presented for the *Day School Certificate* (*Lower*) in the year 1925, after completing a two-years' course, there were 1,098 whose profession included a "commercial" group, comprising at least two of the following subjects, viz. commercial arithmetic, book-keeping and shorthand. The number for 1926 may be expected to be considerably larger. The other subjects taken by the great majority of these pupils would be English (with history and geography), mathematics, and either science or drawing. A very fair proportion, most of them at the larger centres, also take French. These 1,098 pupils constitute 12 per cent. of the total number presented for the certificate in that year. Their average age is about 14½, and the possession of the certificate is evidently regarded by them as likely to assist them in their applications for employment. The great majority of them came from the areas of Edinburgh, Midlothian, Fife, Glasgow, Dumbarton, Renfrew and Dundee.

8. The commercial type of curriculum for the *Day School Certificate* (*Higher*) usually includes the following subjects:—English (with history and geography); mathematics; a foreign language (French is generally taken; sometimes Latin, or German, or in a few cases Spanish. Some pupils take two languages); science or drawing (sometimes both); and the "commercial" group, which consists of book-keeping and commercial arithmetic, shorthand and business procedure, with (in some cases) typewriting.

There is some diversity of opinion as to the stage of the course at which the study of the vocational subjects should be entered upon. Certain schools believe in postponing them all until the third year; others begin book-keeping in the first year, shorthand in the second, and typewriting in the third. The danger of postponement is that pupils who have reached the age of 14, if denied the opportunity of practice in typewriting and shorthand, may be tempted to leave school and enrol in the classes of some business college where they get mechanical instruction to their hearts' content, but miss that general education which is ultimately of more real value. Others argue that the schools cannot in any case hope to compete successfully with business colleges where it is possible to concentrate entirely upon vocational work, and that it is wisest to defer specialised instruction of this nature until the third year, when pupils are more mature and capable of making more rapid progress.

In 1925 the number of schools presenting candidates who had followed a commercial course was 31; the number of candidates was 233, or 5 per cent. of those who were presented for the certificate. These numbers are admittedly small, but it must be borne in mind that 1925 was the first year in which the examination for this new certificate was held, and that a great number of schools continued to work on the lines of the old intermediate certificate course, appreciating the value which had attached to it in the estimation of employers and reluctant to take advantage of the new options. There is, however, good reason to expect a large increase in the number of commercial candidates in the next few years. Many schools have only recently instituted commercial courses which have yet to produce their first crop, and the figures for 1926 fully support this expectation. Candidates who had included commercial subjects in their course were presented from 43 schools, and formed 7½ per cent. of the total number presented. Glasgow, which in 1925 made no contribution to the total, is now providing instruction in commercial subjects at each of its four three-year advanced division centres, and similar arrangements have recently been introduced at Inverness, Wick and Stornoway.

Secondary Schools.

9. The *Leaving Certificate* of the Scottish Education Department is awarded to pupils who leave school at the age of 17 or 18 after completing satisfactorily a secondary course of five or six years' duration. The regulations for the examination were revised in 1924, and now offer a wider choice of subjects. The normal type of course includes as its main subjects English (with history and, for at least part of the course, geography), mathematics, and science, and one or more languages other than English. But candidates may profess any group of subjects which has been previously approved by the Department as constituting a reasonable and well-balanced course. One type which may now be offered is the Commercial Course.

10. The readiness of certain examining bodies to accept the Leaving Certificate as entitling its holders to exemption from their preliminary examinations may be regarded as according it a definite place in the business system of the country. Among the authorities who accept the certificate are :—

The Chartered Accountants of Scotland.
The Chartered Insurance Institute.
The Institute of Bankers.
The London Association of Accountants, Limited.
The Chartered Institute of Secretaries.
The Faculty of Actuaries in Scotland.

Stipulations as to the subjects covered by the certificates are made in certain cases, but in no case is the specialised commercial course demanded.

11. The number of secondary schools in which specialised commercial courses have been instituted is as yet small. In *Edinburgh*, candidates have been presented from George Heriot's School and from Trinity Academy. In *Glasgow* there is a course at the High School for Girls; in *Lanarkshire* at Hamilton Academy; and in *Dumbartonshire* at Clydebank High School. There is also a course at *Wick*, in the High School.

In some of these schools the commercial work is spread over the whole course; in others it is deferred until the last two or three years, and then studied intensively.

12. There are other secondary schools in which some commercial work is done, not as part of a regular commercial course, but in addition to the subjects of a normal curriculum. In 1926 forty-seven candidates from fourteen schools took the papers in book-keeping and commercial arithmetic at the Leaving Certificate examination; the number receiving instruction in these subjects, but not actually presented, was considerably greater. One school presented candidates in economics and economic geography. Spanish, studied in most cases, no doubt, because of its commercial utility, was taken by seventy-one candidates from thirteen schools.

13. Pupils who leave a secondary school after completing only three years of the full course are admitted to examination for the Day School Certificate (Higher). Many of these take commercial subjects as a constituent of their course.

Continuation Classes.

14. If Scotland is considered as a whole, it is in the classes and courses of the continuation-class system that the bulk of specialised commercial instruction is given. The system is now organised under regulations which were issued in 1926, whereas the most recent figures available are those for the session 1924-1925, when the previous regulations were in force. But the statistics under the old organisation which made a similar distinction between classes and courses may be taken to show approximately the results likely to be forthcoming under the new.

15. *Classes.*—These may be attended singly, or in small groups, by young persons above school age who are unable to avail themselves of the more fully organised courses, and in some cases the work may be completed in one session. In 1924-1925 classes were provided at 519 centres situated in every county of Scotland except one. In the following table English, arithmetic, and foreign languages have been included, in addition to the specifically "commercial" studies. It is not possible to say to what extent these subjects are taught with a commercial bias; but it is reasonable to presume that a fair proportion of the students taking them have had some commercial purpose in view.

The number of persons studying the several subjects of commercial utility in 1913–14 and in 1924–25 was as follows :—

	1913–14.	1924–25.
Accounting	—	33
Banking	74	39
Book-keeping	7,365	5,999
Business Procedure	807	505
Commercial Correspondence	789	626
Handwriting	971	159
Commercial Law	30	9
Political Economy	185	68
Salesmanship	—	158
Shorthand	12,139	5,894
Typewriting	2,800	2,645
Arithmetic	11,857	6,522
Geography	3,192	752
English	15,267	7,687
French	1,649	1,034
German	637	162
Italian	—	32
Spanish	—	402

The figures refer to the number of persons taking *Classes* under "Division II" in the subjects specified; but since 1913–14 Commercial *Courses* under "Division III" (*see* par. 16) have developed considerably, the numbers attending in 1924–25 (about 24,000) being double those attending in 1913–14 (about 12,000). During the same period, the numbers attending classes of all kinds under "Division II" fell from 81,380 to 67,541. In other words, while fewer students are now taking classes in isolated subjects, more are taking courses.

16. *Courses.*—These extend over at least four sessions, but the complete course is not necessarily provided at one centre; where pupils are transferred for the later years to a centre giving more advanced instruction, the Department ensure that the work of the various years is suitably connected so as to form a single well-graded course. The courses are open to pupils who have reached at least the stage of the Day School Certificate (Lower) before their enrolment in the first year of the course, or who have successfully completed the work of a preparatory course under the Continuation Class Code. Students who hold the Day School Certificate (Higher) may be at once enrolled in the third year of the course.

During the session 1924–25 commercial courses were held in the majority of the counties of Scotland. These were as a rule general commercial courses designed to meet the needs of those who require either book-keeping or shorthand as the predominant subject. In a

few cases, however, courses for book keepers and shorthand-writers were kept distinct. There were other courses of a more specialised type. The total figures as to the number of pupils are as follows :—

	Preparatory.	*1st year.*	*2nd year.*	*3rd year.*	*4th year.*
General commercial courses*	3,857	11,680	4,239	2,015	574
Shorthand	2	112	61	60	65
Book-keeping	11	222	51	34	—
Banking	—	128	105	117	68
Chartered Accountancy ..	—	24	19	20	–
Insurance	—	27	—	—	—

The total number of centres providing such courses was 254. In addition, there were in Aberdeen, Dundee, Edinburgh, and the counties of Dumbarton, Fife and Lanark fully organised language courses, which were no doubt of service to many pursuing, or intending to pursue, a commercial career.

Two typical schemes, one from a burgh and another from a county centre, may be of interest.

(a) *Aberdeen : Central Continuation Classes.*

1st and 2nd year : English (including commercial correspondence), arithmetic, book-keeping and/or shorthand.

3rd and 4th year : Shorthand and/or book-keeping, and one or more of :—English, arithmetic, business procedure, secretarial work, commercial geography, history, economics, home and foreign trade.

N.B.—Classes in French, German, Italian or Spanish are available at another centre.

(b) *Ayrshire, Ardrossan Academy Continuation Classes.*

1st year : English, history, commercial arithmetic, office routine, and shorthand or commercial correspondence or a foreign language.

2nd year : English, history, *two* of :—shorthand, typewriting, book-keeping, a foreign language, commercial arithmetic.

3rd year : *Three* of :—shorthand, typewriting, book-keeping, a foreign language, commercial geography, industrial history, economics, commercial law, accounting, business methods, a second foreign language, etc.

4th year : *Three* of :—shorthand (speed), book-keeping, and the remaining subjects of the 3rd year excepting typewriting.

17. In the education areas of Argyll, Ayr, Clackmannan, Dumbarton, Lanark, Renfrew and Stirling the organization of classes in commercial subjects is regulated by a scheme of affiliation with the

* The corresponding figures for general commercial courses in 1913–14 were: Preparatory year, 2,611; first year, 5,816; second, 2,197; third. 866; fourth, 91, or a total of 11,581 compared with 22,365 in 1924–25.

Glasgow and West of Scotland Commercial College (see paragraph 20). The work of the college itself extends over three grades, leading respectively to a Junior Certificate, a Senior Certificate, and a Diploma; and the work of the affiliated classes is standardised and arranged so as to lead to the Junior Certificate of the College. The scheme is only now beginning to reach the stage of fruition, so that statistical evidence of its success in the form of the numbers of actual certificates gained is not yet available. The number of candidates presented at the final examination conducted by the Joint Committee in 1923–24 was 634, and in 1924–25 it was 1,487. There seems to be no doubt in the minds of the Directors of Education and the Continuation Class Supervisors as to the beneficial effects of the affiliation scheme. The planning of the work for the local classes on a definite progressive basis is very helpful, and the prospect of certificates has a stimulating effect on the attendance and diligence of the students.

18. Some information regarding continuation-class work in the four largest cities may perhaps be of interest.

(a) *Edinburgh.*—Fully organised courses were carried on during the session 1925–26 at six "Commercial Institutes," the total number of commercial students being 2,863. Classes in commercial subjects were also held at 12 centres in Edinburgh, 3 in Leith and 5 in the suburbs, attended by 1,303 pupils in all. For the session 1926–27 it is intended to transfer the classes at several of the smaller centres to the neighbouring commercial institutes.

A scheme for the award of Commercial Certificates by the Edinburgh Chamber of Commerce in co-operation with the Edinburgh Education Authority and the Governors of George Heriot's Trust has now been in operation for some years. The object is to promote the systematic training of young persons who are preparing for a commercial life. By making English and arithmetic compulsory subjects for the junior certificate, and English, higher arithmetic, and a foreign language compulsory for the higher certificate the scheme has done much to discourage immature specialisation in the more vocational subjects; and it is reported to be having a marked effect not only on the quality of the work done but also on the regularity of attendance. Candidates may be presented for examination in single subjects as well as for the certificates, and in the session 1924–25 there were 590 entries from the continuation classes.

(b) *Glasgow.*—When the affiliation scheme mentioned in paragraph 17 was proposed in 1922, the Glasgow Education Authority agreed to join it. They offered special classes under the scheme at two centres in the city, but no students came forward, and a year later the Authority withdrew from the affiliation. As the Glasgow and West of Scotland Commercial College itself conducts a series of elementary classes for its Junior Certificate in Glasgow, it is evident that there is not the same demand for special classes conducted by the local authority in the city as in the surrounding districts.

Commercial work in the Glasgow continuation classes is spread over 31 schools, and in each of thirteen districts there is a more advanced centre. At these centres the course extends over four years, with six hours of attendance per week. The general scheme, with variations in certain cases, covers instruction in English and arithmetic (these are not compulsory for students over 17 years of age or for those holding a Day School Certificate (Higher) or its equivalent), French, German, Spanish, mathematics, shorthand, book-keeping and typewriting. For those below the Day School Certificate (Lower) stage of proficiency there are preparatory courses which provide instruction in English, arithmetic and office routine—two hours of each per week.

(c) *Dundee.*—It is customary for the pupils in Dundee continuation classes to prepare either for the Society of Arts examinations or for the Junior Certificate of the Dundee Chamber of Commerce Education Committee. In both cases, single subjects may be professed. Under the Chamber of Commerce scheme for a Junior Certificate,* English, history, geography and arithmetic are obligatory, and any two of the following four:—Penmanship and business routine, book-keeping, shorthand, a foreign language.

Here the influence of the Chamber of Commerce is contributing materially to the upbuilding of a sound system. The schemes which they have formulated operate not only in the city, but also in Perthshire, Forfarshire, and Fife, and take cognisance of the character of office work during apprenticeship, while financial and preferential advantages are offered by employers to those who obtain certificates. The increase in the number of candidates for the Junior Certificate during the last seven years is considerable, the number having grown from 122 in 1919 to 752 in 1925.

(d) *Aberdeen.*—The Aberdeen Education Authority have organised courses extending over three or four years, the first and second of which are spent in classes held in one or other of seven schools in the different districts of the city, the third and fourth at the Central Secondary School. Information as to the scheme of instruction is given in paragraph 16.

The Aberdeen Chamber of Commerce encourage the study of commercial subjects by holding an examination in certain of the compulsory and optional subjects, and awarding certificates to successful candidates. Employers are recommended by the Chamber to give preference to holders of these certificates.

Central Institutions.

19. *Edinburgh, The Heriot Watt College.*—Evening classes are held in the following subjects:—Book-keeping (in three grades), principles of accounting, costing and cost accounts, commercial

* Information as to the regulations for the Senior Commercial Certificate will be found in paragraph 21 under "Central Institutions."

correspondence and précis writing, general and commercial geography, economic science, modern economic history, commercial arithmetic, French, commercial French, German, Spanish, commercial Spanish, Russian, practice of commerce, banking, commercial banking and insurance law, algebra for accountants and bankers, actuarial science, English language and composition, grocery trade (lectures on sixteen commodities).

20. *The Glasgow and West of Scotland Commercial College.*—The activities of this institution are so numerous and varied that only a summary of them can be given here. Its evening classes, which were attended during the session 1925–6 by 1,862 students, are organised in sections, each covering a wide range of subjects :—(1) English and secretarial work, (2) Book-keeping, accounting, and mathematics, (3) Insurance, (4) Modern foreign languages, (5) Finance and economics, (6) Law, (7) Transport.

During the day, classes were held in some ten subjects, and were attended by 190 students.

The Governors of the College make five different types of award in connection with the work carried on in the classes, and they are confident that business firms and public bodies will give recognition to these qualifications when making appointments or promotions. The types are :—(1) Class certificates, (2) Group certificates (day classes), (3) the junior certificate, (4) the senior certificate, (5) the diploma of the college.

The diploma has been recognised by the Scottish Education Department. It may be gained after courses of study in commercial accounting, commerce, manufactures or industrial management, secretarial work, banking, foreign correspondence, and commercial knowledge, these extending over five or six years of evening work as a rule. After completion of the course, candidates are required to satisfy the Governors of their general business qualifications, as well as in appearance, manner of speech and bearing.

The scheme whereby the continuation classes in certain counties are affiliated to the College has been already described in paragraph 17.

21. *The Dundee Technical College and School of Art.*—By arrangement with the Dundee Education Authority, but not on its own responsibility, this College provides training in advanced commercial subjects for the senior certificate of the Dundee Chamber of Commerce. To qualify for that certificate, candidates are required to pass in home and foreign trade, finance, and the economics of industry, as well as in any two of the following subjects :—Book-keeping, banking, commercial law, a language. They must also secure a certificate as to practical skill from their employer. The number of candidates for the certificate grew from 16 in 1919 to 104 in 1925.

The Universities.

22. *Aberdeen.*—The degree of Bachelor of Commerce was instituted in 1919. The course, extending over at least three academical years, is meant to meet the needs of those preparing for careers in commerce and administration by providing opportunities for the study of subjects cognate to their future pursuits. In particular, the classes are designed to train those who desire to pursue any of the following: general business and financial work; banking, insurance, accountancy; transport services; foreign trade agency and consular services; certain special branches of journalism and teaching.

The compulsory subjects are:—political economy; organisation of industry and commerce; economic statistics; accounting and business methods; a modern foreign language; economic geography; mercantile law.

The main optional subjects are:—economic history; advanced political economy; public finance; banking, currency and foreign exchanges; advanced economic history; industrial psychology; advanced geography; a science; a second foreign language (modern) or an advanced course in the language already studied.

The number of graduates in commerce in the last six years is as follows:—1921, 1; 1922, 16; 1923, 20; 1924, 12; 1925, 7; 1926, 13.

23. *Edinburgh.*—The degree of Bachelor of Commerce was instituted in 1919, and is awarded after a course of not less than three academical years.

The compulsory subjects are:—political economy; organisation of industry and commerce; accounting and business method; mercantile law; economic geography; economic history; a modern foreign language (French, German, Italian or Spanish); *either* a second modern language *or* one of:—engineering, chemistry, physics or psychology.

To make up the required number of full courses, any of the following optional subjects may be chosen:—realistic economics and finance; further courses in the second, third, fourth or fifth of the compulsory subjects named above; imperial and colonial history from 1783; statistics and mathematical economics; banking; public international law; industrial law.

The number of graduates in commerce in the last seven years is as follows:—1920, 1; 1921, 9; 1922, 20; 1923, 35; 1924, 34; 1925, 25; 1926, 30.

The University also awards a Diploma in Actuarial Mathematics.

24. *Glasgow.*—In the University of Glasgow a Chair of Accountancy has recently been established; the course of lectures began in 1926.

25. *St. Andrews.*—At the University of St. Andrews regulations for a degree of Bachelor of Commerce have been drawn up, but no special courses have as yet been instituted, and the degree is not meanwhile granted.

V.—TECHNICAL AND COMMERCIAL EDUCATION IN FOREIGN COUNTRIES.

The material available from official sources in regard to foreign systems of technical and commercial education is not sufficient to enable a complete account of those systems to be given, and still less a comparison between this country and other countries in this respect. A report on Trade and Technical Education in France and Germany was issued by the London County Council in March, 1914 (No. 1662), but no official account of post-war developments appears to have been published in this country. In these circumstances, all that is possible is to bring together a few notes on the subject derived from a number of different sources.

Further Education in Schools.

Germany.

In comparing Germany with this country, it was possible to say before the war, and it is perhaps substantially true to-day, that while in Great Britain many avenues of training were provided, the individual was left to find them for himself and to use them or not as he pleased; Germany on the other hand aimed definitely at the building up of a great industrial nation by the systematic training of all grades, from leaders to workmen. "The State, the Municipality, the employed and the employer have all come to believe in education of all types including compulsory continuation education. The State and the parents have both adopted the long view, the former in looking forward to the ultimate value of the work of the schools and the latter in foregoing immediate wage returns of their children for future prospects. In Berlin, Munich, Leipzig and other towns the organised efforts of the State and the Municipality are reaching every boy (and in a few cases every girl) in a way that would hardly be credited in England but for the fact that experienced officers have seen it in operation. Continued education in England still follows the plan of *laissez faire*, or go as you please. Germany possesses a national organisation for definite national objects."* It is significant that in Germany it is generally under the auspices of the State Ministries of Trade and Commerce that vocational education, as distinct from education in applied science on the university plane, has been developed.

An account of post-war arrangements for vocational education in Germany is available in the "Handbuch für das Berufs und Fachschulwesen," published in 1922. According to this, there is extensive development, through the several States, of compulsory day continuation schools for boys, which in the more populous

* L.C.C. Report on Trade and Technical Education in France and Germany, 1914.

localities tend to be organised on vocational lines, occasionally with facilities for craft instruction. It would appear that simple instruction in trade matters (and for hand workers craft training) receive more attention and reach a larger proportion of the young workers in an occupation than is customary in this country. On the other hand, instruction of a more scientific character, including opportunities for experimental work in laboratories, of the type which is available for able working-class students in evening technical schools in the principal industrial towns of this country, seems to be less freely provided in Germany for students of a corresponding class, who, if they wish to obtain similar instruction, are apparently expected to abandon their employment in order to attend full-time day courses.† In the London County Council report already referred to, it was stated that the great development of voluntary evening technical instruction in this country, which may be classed largely as middle but partly as lower technical education, found no adequate parallel in the systems of France and Germany. The report stated that the authorities "do not appear to realise its possibilities, or perhaps too strongly realise its limitations." There appears, however, to have been some change, in this respect, since the war, for in Germany evening classes are now numerous, at any rate in connection with the continuation and engineering schools.

The continuation school system as projected for this country by the Education Act of 1918 was modelled on Germany's, but if the Act had come fully into operation in this country it would have set up a system very much more thorough than the German system as actually in operation. The Act, for example, placed upon all local education authorities a statutory duty to provide a sufficient number of day continuation schools for young persons in their respective areas; no such general obligation exists in Germany. It is true, however, that over a very large part of Germany, especially urban areas, schools are provided, and in those areas young persons are compelled to attend. It is also true that since the war, while little progress has been made in the establishment of continuation schools in this country, the German system has been made more complete, and compulsion has been rapidly extended to new areas and to new classes of young persons. The contrast between the fragmentary beginnings of the system of continuation schools which this country can show and the wide and rapidly extending provision in Germany is a fact of very great importance.

The United States of America.

In the United States there has been since the War a very considerable development of continuation and technical education. Many of the states, including the most highly industrialised, have now made

† The extent to which full-time sub-university courses have been provided in Germany suggests that the opportunities open to and the actual demand for men with that type of training have been larger than in England.

attendance at part-time continuation schools compulsory for young persons between the ages of 14 and 16 or 18. The movement of public opinion which has brought this about is, no doubt, responsible also for another very significant development, namely, the establishment of the Federal Board of Vocational Education.

This Board was established in 1917 to co-operate with the states of the Union in the promotion of vocational education in agriculture, trades and industries, the scope of such education being defined as of less than college grade. The Board has at its disposal an annual grant of, now, something over $7,000,000, of which a little more than $3,000,000 is devoted to industrial and trade education, including "home economics" and part-time general continuation education. It works on the principle of subsidising, on the dollar for dollar basis, approved programmes of work formulated by the state authorities. The stimulus of the Federal Board's grants has, however, brought about a very much larger expenditure on vocational and continuative education by the states, and since the commencement of its operations the states have spent on the average over 2, and in some years nearly 3, dollars of their own money for every dollar of grant received from the Federal Board. The total expenditure on work aided by the Federal Board has risen from about $3,000,000 in 1918 to $22,000,000 in 1925. Of the latter sum general continuation schools account for rather less than $4,000,000, trade and industrial schools and classes for $5,600,000, and agriculture, home economics, and the training of teachers for the rest.

The work covers a very large variety of types, not only full-time agricultural and technical courses in high schools and trade school for young persons between the ages of 14 and 18 and part-time continuation classes held in the day or evening for adolescents of the same age, but also part-time and industrial classes, day and evening, for adults, men and women, already in employment or seeking to be trained for employment.

In 1925 the total enrolment in schools of all types aided by the Federal Board was 659,000. Of these 156,000, including 39,000 full-time, were enrolled in schools and classes other than general continuation, home economics or agriculture. To this number, however, must be added those who attended technical and industrial schools and classes in respect of which no Federal Board grant was made.

The Board does not aid commercial education financially, but it has conducted a series of investigations as to the most suitable forms of commercial education and is prepared to advise public authorities as to methods of organisation, courses, teaching, etc.

One fact of significance should be mentioned; although the Federal Board money is applicable only in respect of educational facilities provided by public bodies, the state authorities concerned with the provision of vocational education in many cases work hand in hand with employers in the matter of classes for employees, training for foremen, etc.

France.

In France the arrangements for technical and commercial education have been re-organised by the Astier Law of 1919, and in 1920 were removed from the supervision of the Ministry of Commerce and placed under an Under Secretary for Technical Education, attached to the Ministry of Public Instruction. Each of the "Departments" into which France is divided has a committee for technical instruction whose duty it is to study the needs of their area, and, in co-operation with representatives of industry and commerce, firms, Chambers of Commerce, Trade Associations, etc., to provide for their satisfaction. Apprentices and young employees under 18 years of age can now, in districts specified by Ministerial Order, be compelled to attend courses of training (*cours professionels*) for three years for 100 to 200 hours a year during the working day. In 1923–24 the number of young employees attending such courses was 148,000; in 1924–25 it increased to about 300,000. Another effect of the re-organisation has been a considerable increase in the number of full-time schools of industrial and commercial education (*écoles pratiques de commerce et d'industrie et écoles de métiers*). In 1924–25 the number of students attending these schools was 29,000 as compared with 15,000 in 1913.

It is stated in the Report by the Commercial Counsellor to the British Embassy in Paris issued in 1926, that one of the innovations of the 1925 Budget was the institution of the apprenticeship tax, which aimed at making good, by the levy of contributions on employers, that deficiency in craft knowledge and that lack of skilled workers that has been lamented by industry and commerce in France as one of the consequences of the war. The development of technical skill is to be secured by encouraging apprenticeship in the workshops and factories and by promoting the activity of commercial and industrial schools, craft schools and similar undertakings. The new enactment obliges all employers of labour whose wages and salaries total at least 10,000 francs to pay this tax, the rate of which is to be fixed by the annual Finance Law. Its rate for 1925 and 1926 was 20 centimes per 100 francs of the wages and salaries paid. Concerns which can show that either directly, or through their trade associations, or through their chamber of commerce, they pursue the same object, may be totally or partially exempted. Thus such exemption is accorded in respect of expenditure by them on technical education courses; on technicians occupied exclusively in instructing apprentices (not more than 10 to each instructor); on wages to apprentices while following a systematic course in works or while following courses of professional instruction; on subscriptions to schools or towards scholarships; or on subventions or contributions to similar courses by trade organisations.

Commercial Education at the University Stage.

This section relates only to the system of commercial, as distinct from technical, education in the universities and commercial colleges of Germany and the United States of America, and is based on Sir William Ashley's recent book "Commercial Education," which contains chapters on commercial training in the German and American universities. These show that commercial education in the universities of those countries is being pursued with considerable enthusiasm. Whatever may be the real and ultimate value of the commercial degree in relation to practical business life, it is the case that where such degrees are sought in this country by tens of students, they are sought in both those countries by hundreds.

Germany.

The movement for university training for commerce is much more widespread in Germany, and more warmly supported by business circles, than it is in this country. It began about the same time as in Great Britain, and already in 1912–13 there were in Cologne, at what was then a commercial college and is now a university, 535 matriculated students, with an attendance of many hundreds of the Cologne public at open lectures. Thus there were in Cologne nearly as many commercial students as there are now in all the universities which offer a commercial degree in this country put together. The effective support of the movement came from industry rather than from commerce in the narrower sense. "It was the big manufacturing companies which felt the want of men capable of growing up into positions of responsibility; and of course, these manufacturing concerns in Germany, as in other countries, were beginning to free themselves in large measure from the old merchant houses and to do their own buying and selling direct."

In Germany the only degree until recently at the universities was the doctorate, for which a somewhat high intellectual standard was insisted on. Before the war, economics occupied an honourable position, but hardly a foremost one, so that the development of higher commercial studies took place chiefly in the Handelshochschulen, or commercial colleges. There was at the same time a growth of serious students of economics at the universities proper. The whole movement was, in fact, developing. This steady growth was interrupted by the war and disturbed by the conditions following the peace. Crowds of young men now began to study economics for new purposes, many because they thought it of service as a preparation for business careers. The doctorate, instead of being the goal of a small intellectual élite, became the goal of a crowd of quite ordinary students, and it became clear that a more suitable curriculum and certificate of merit should be provided for the much larger number of students who did not aim at being men of learning, but looked forward to practical business or administrative careers. After much discussion there was created

in 1923 an Economists' Diploma, to be granted by the universities, and therewith the status, protected by law, of "Diplomaed Economist." This was to be reached after three years, and students could of course go on to the doctorate. These new arrangements were, however, not completely satisfactory to the commercial colleges, which, while keeping their existing commercial certificates, awarded after two years of study, have introduced a three year diploma course (different from that for the Economist's Diploma) leading to the degree of Diplom-Kaufmann (diplomaed commercial man). In 1926 the commercial college at Berlin began to confer the Doctorate in Economics.

Sir William Ashley points out that it is too soon to comment on the working of the new system. He adds that the number of persons following economic studies (in a very wide sense, including accounting on the one side, and social economics on the other) at universities and commercial colleges is still very large. At all the commercial colleges in 1913–14 they numbered 2,592; in 1924–25, 4,971. At the universities existing in 1913–14, if students largely engaged in economic study while registered in other departments be included, the number of students of economics more than quadrupled in the same period, rising from 2,316 to 10,957, while the total number of students in all departments had hardly changed, being about 60,000 both in 1913–14 and 1924–25.

The United States of America.

In the United States it appears that there is at present a widespread and remarkable desire for education and for the full development of intellectual capacity. This extends through all grades of society, including industrial workers, who are beginning to aim at a college education for their children. As a consequence the universities and colleges in the United States cannot cope with the number of applicants for admission. Corresponding with this demand, a very great effort is now being made to provide in the universities a suitable training for business life, and much thought is being expended on the form that training should take. The movement for business training in the universities is now quite certainly the largest of the waves passing over American universities. Engineering and technical schools continue to grow, but they are no longer in the forefront of academic interest. About 100 American universities and colleges have schools or departments of business administration or commerce with an enrolment in 1924 of 80,000 students, a figure out of all proportion to the few hundreds to be found taking similar courses in this country. Business courses are not confined to the business schools and universities; they are found also in engineering schools.

It may be added that the great majority of the American university Business Schools are undergraduate schools; but a notable exception exists at Harvard, which is a graduate school, requiring four previous years of college instruction.

CHOICE OF EMPLOYMENT.

Official Arrangements for advising Boys and Girls as to Employment and assisting them to obtain it.

[*Based on information supplied by the Ministry of Labour and the Board of Education.*]

The foregoing sections have described the existing arrangements for industrial recruitment and workshop training on the one hand, and the facilities for technical and commercial education on the other. In order to complete the survey, it is necessary to refer to the official arrangements for advising young persons as to the best employment to take up and for assisting them to obtain it; but, as this question is covered by the terms of reference to the committees under Mr. Malcolm and Lord Salvesen,* only a brief reference is required here.

For England and Wales the Education (Choice of Employment) Act, 1910 (subsequently embodied in the Education Act, 1921), authorised local education authorities to establish Juvenile Employment Bureaux for the work of advising boys and girls with regard to the choice of employment. A number, but by no means all, of the Local Education Authorities in England and Wales decided to avail themselves of the powers given by the Act of 1910 and for the administration of the service set up Juvenile Employment Committees which were Sub-Committees of the Authorities' Education Committees. In other areas the work fell to the Board of Trade and subsequently to the Ministry of Labour under the provisions of the Labour Exchanges Act, 1909, the local arrangements being carried out by Juvenile Departments of the Employment Exchanges, to which Juvenile Advisory Committees were usually attached. The administration of unemployment benefit in respect of juveniles was undertaken in all areas by the Board of Trade, and later, by the Ministry of Labour. It should be added that the juvenile employment work of Local Education Authorities was, during this period, based on arrangements for co-operation with the Board of Trade (or Ministry of Labour) which left considerable responsibilities to these departments.

In 1921, Lord Chelmsford, at the request of the Government, made an enquiry into the working and effects of these co-operative arrangements, which as a result of his Report were terminated. Necessary statutory sanction to other of his recommendations was given by the Unemployment Insurance Act, 1923. The position is that since 1st April, 1924, "Choice of Employment" powers cannot be exercised by local education authorities unless they also undertake the administration of unemployment insurance for boys and girls.* Further, the termination of the co-operative arrangement meant that thenceforward authorities exercising powers were responsible for all aspects of advising juveniles and placing them in employment.

* See page 23 and footnote * page 29.

Since the Education Act of 1918, the age range of boys and girls dealt with under these arrangements is the 14th to the 18th birthdays. The following particulars show the extent to which education authorities have decided to carry out the work. In England and Wales, up to June, 1926, the education authorities of 57 County Boroughs and 12 Counties had decided to exercise powers under this system and those of 25 County Boroughs and 51 Counties, including London, to leave the work to the Ministry of Labour; in the case of Boroughs and Urban Districts the work at the same date was done by the County Councils or local education authorities in 71 cases, and by the Ministry in 102 cases. There were at the same date about 340,000 insured persons between 16 and 18 years of age in England and Wales in the areas of local education authorities exercising powers and 460,000 in the areas for which the Ministry was responsible. In Scotland, under the Education (Scotland) Act, 1908, Education Authorities may exercise powers for giving advice and assistance to children about employment. Only in the case of Edinburgh have these powers been taken up. In other areas in Scotland the duty of giving such assistance to boys and girls has been left in the hands of the Minister of Labour (in succession to the Board of Trade), and the Minister has appointed 33 Advisory Committees for Juvenile Employment in the principal industrial areas in Scotland. In Edinburgh, the work is shared between the Education Authority and the Ministry.

With a view to testing the success of the advice as to choice of employment given to individual boys and girls and with the object of giving further advice in cases where it is needed, arrangements are very generally made to watch the after-careers of juveniles in employment. For this purpose Local Education Authorities and Juvenile Advisory Committees have prepared schemes, designed to meet the needs of the particular locality, for the "after-care" or "industrial supervision" of employed juveniles. The methods of supervision include personal interview (this is very often arranged by inviting the boys and girls and their parents to report at an "open evening" at the Employment Exchange or the Education Authority's Bureau), enquiry from employers and co-operation with voluntary social organisations.

The subject of advice as to choice of employment, or, as it is sometimes called, vocational guidance, is one which has been receiving much attention of recent years beyond the work done by the committees engaged in carrying out the official arrangements. Some studies have been made of the question by the Industrial Fatigue Research Board,* and a number of publications dealing with the results have been issued. Further, the National Institute of Industrial Psychology† has given attention to the subject from the point of view of the effect of defective recruitment on industrial

* See "Survey of Industrial Relations," pp. 171–8.

† See note on page 264.

efficiency as affected by psychological factors. The Institute, starting from the premise that if young people are to be given the best advice as to the occupations in which their individual talents make them most likely to succeed, knowledge should be available not only of the particular characteristics of each child but also of the requirements of each occupation, advocates the making of a scientific "Job Analysis" of each occupation by means of psychological tests carried out by an expert. An experiment on these lines is being carried out by the Institute, in co-operation with the Ministry of Labour, at an important Employment Exchange in London, but it is too early for numerical data to be available.

NOTE ON THE NATIONAL INSTITUTE OF INDUSTRIAL PSYCHOLOGY.

[*Based on the evidence given before the Committee on Industry and Trade by the Director of the Institute.*]

The National Institute of Industrial Psychology was incorporated in 1921 with the object of promoting the application of psychology and physiology to industry and commerce. It is a voluntarily supported body having some 500 members, the larger number of whom are employers of labour, though the membership includes individuals such as foremen, welfare workers and departmental managers, as well as institutions and libraries. The income of the Institute is derived from subscriptions made by its members and from payments obtained for specific investigations carried out on behalf of individual firms or industries. This income is expended solely in extending the activities of the Institute.

An indication of the nature of the work done by the Institute may best be given by means of mention of the various points to which its investigations have had special reference. These may be divided into four categories :—

(*a*) The quality, productive capacity and efficiency of plant.
(*b*) The elimination of factory waste.
(*c*) The recruitment and training of labour and other staff.
(*d*) The length and distribution of hours of labour.

The investigations are made by trained investigators, who, when conducting an investigation, live the life of the workpeople for perhaps several months and direct their attention to the obstacles, particularly those of a psychological or physiological kind, which prevent the workpeople from giving their best. The Institute also trains investigators for individual firms, who, after a training normally of about three months, return to employment with the firm concerned, where the Institute continues to assist them and to supervise their work. According to the evidence given to the Committee the Institute is spending more time year by year in training persons in industrial psychology for individual firms.

CHAPTER III.

STANDARDISATION.

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STANDARDISATION.

(*Furnished by the Board of Trade.*)

There are several different aspects of standardisation which it is important at the outset to distinguish. Generally speaking, the term denotes the preparation and application of definite specifications which are either compulsorily enforced or voluntarily adopted in connection with production or manufacture or with the sale or marketing of raw materials, natural products and foodstuffs. The specifications may relate to dimensions, composition, quality, or performance; or to several or all of these. For example, in the case of articles like screws and bolts, accuracy of size is the predominant feature of standardisation. On the other hand, in the case of certain engineering materials, e.g., cement, the essential requirements are of quality and performance. Again, the enforcement of standard qualities in the case of foodstuffs, drugs, etc., relates primarily to composition (or materials) and quality.

One of the most important aspects of the subject arises from the application of standardisation to the *units* used in commercial transactions or scientific investigations, and it will be convenient to deal with this aspect first before proceeding to discuss standardisation in general.

Standard Units of Measurement.

This aspect of standardisation relates to the construction, maintenance and enforcement of standard units of measurement, such as units of length, mass and volume, units of value (coinage), units of electricity, and units of time.

As it is obviously a fundamental necessity of trade that the units used should be of known and certain magnitude, the action necessary to secure this result constitutes a function of the Government in at least all developed countries; and in this country weights and measures have been the subject of Governmental action and regulation from very early times. Prior to 1866 the subject was dealt with by the Exchequer, but since that year the department principally concerned has been the Standards Department of the Board of Trade, which is entrusted with the care and maintenance of the Imperial standards of length, mass and volume. The Board of Trade were also originally responsible for the electrical units, but these were transferred in 1920 to the Ministry of Transport; and the necessary apparatus and staff connected with the maintenance of these units are located, under the responsibility of the Ministry, at the National Physical Laboratory. The Royal Observatory at Greenwich is responsible for maintaining standard time.

The governmental functions connected with standard units of measurement have three main aspects, namely :—

(1) The definition or formulation of the units ;

(2) The construction and maintenance of either material standards representing those units (e.g., a metal bar representing the yard or a metal mass representing the pound) or standard means of reproducing the units previously defined (e.g., the specification of an electrical resistance standard (the ohm) in terms of the mass and length of a column of mercury) ; and

(3) Action to enforce the use of the units and prevent the use either of unauthorised units or of incorrect representations of the authorised units.

The units of length, mass and volume used in this country are of ancient origin, and a long series of standard representations of them have been constructed throughout the centuries. The existing primary standards are preserved with the utmost care in the Standards Department,* and certain statutory copies of these (known as Parliamentary copies) are deposited in different places (e.g., the Royal Mint, the Royal Observatory, and in the Houses of Parliament, where the standards are sealed up in the wall), the object being to provide against the contingency of loss or destruction of the original standards. Through a series of inter-comparisons prescribed by law, the working standards used in the Department are maintained in a known relation to the primary standards, and can thus be used in verifying the sets of local standards kept by County Councils and Town Councils throughout the country, these being the authorities to which the local administration of the Weights and Measures Acts is entrusted. The local standards in turn form the basis of the tests applied to traders' weights and measures by the inspectors of weights and measures appointed by the local authority in each district. By this means uniformity and accuracy throughout the country are provided for. In addition to dealing thus with weights and measures (of length and volume) of the ordinary kind, the Board of Trade lay down regulations for weighing instruments, and all new patterns of instruments must be examined and approved by the Department before they can be stamped for use in trade by the local inspectors. The full powers of the Department and of the local inspectors have not hitherto extended to measuring instruments, but this defect has been remedied by the Weights and Measures Amendment Act, 1926. The Standards Department administers the regulations as to the construction and testing of gas meters which have been issued under the Gas Regulation Act, 1920.

* Most of the special scientific work required for the maintenance of the standards is now conducted at the National Physical Laboratory, which has all the equipment required for the requisite investigations into the physical and chemical problems involved, such as age creep in metals and the thermal expansion of metals, liquids and gases.

It should perhaps be mentioned that, while the law requires that, in transactions which are on the basis of weight and measure, only the standard units of weight and measure should be employed, it does not generally forbid transactions on other bases, e.g., sales by number (as dozen) or quantity (as bottle, "glass," "sack") or money's worth (as pennyworth).* In some such cases abuses may arise through the absence of standards. For example, contracts transacted on some basis other than that of weight or measure are not infrequent in the wholesale trade in agricultural produce. In this connection the Departmental Committee on Distribution and Prices of Agricultural Produce in their Interim Report on Fruit and Vegetables (Cmd. 1892/1923) strongly emphasised the unsatisfactory consequences arising from the absence of packages of uniform or standard size for the sale of such produce. The containers used are generally of some distinct reputed capacity, but it was found, for example, that baskets reputed to hold 3 lb. varied by as much as 55 cubic inches in their capacity, a variation of nearly one pound of fruit when full. It was mentioned that the Ministry of Agriculture had endeavoured to standardise the capacity of packages in certain cases, and that the Federation of British Growers had issued recommendations as to standard types of containers for produce of various kinds; but the Committee attached so much importance to the subject that they recommended that wherever fruit or vegetables were sold in some other manner than by count, number or net weight, a standard package should be used, and that failing action for this purpose on the part of the industry itself, the advisability of legislation should be considered.

The position in connection with the verification of the coinage in this country is interesting, as in pursuance of a very ancient practice the products of the Mint are tested annually by a jury representing the Goldsmiths' Company, who examine (by weighing and assaying) specimen coins set aside from each batch minted during the year. For the purpose of this test, which is known as "the trial of the pyx," the Board of Trade provide the necessary weights and balances for weighing the coins, together with trial plates of gold and silver by which the results of the assay are tested.

Some of the standard units of measurement (e.g., electrical units) are practically universal, but this is not the case as regards the units of length and mass, and their derivatives. The only other system which requires mention here is the metric system. In this the units are not, like those used in this country, of ancient origin, but were established first in France about the end of the eighteenth

* In some cases it is compulsory to sell by weight (e.g., coal and bread) or by measure (e.g., beer in quantities of half-a-pint and upwards); and a considerable extension of the classes of goods which must be sold retail by net weight is effected by the Sale of Food (Weights and Measures) Act, 1926, which follows the recommendations of the Food Council regarding short weight.

century. The basis of the system is a unit of length which was intended to be equal to one ten-millionth part of a quadrant of the earth through Paris; but the unit does not in fact correspond exactly with its theoretical definition. The system has been widely adopted in Europe and South America, while the British Empire and United States of America adhere, generally speaking, to the system used in the United Kingdom. Annex 1, p. 283, shows the percentages of British export trade in 1913 and 1925 with countries using, in their trade returns, the metric system and the British Imperial system respectively.

The metric system forms the subject of an International Convention drawn up in 1875, when some 20 States subscribed. Under this Convention there was established near Paris the International Bureau of Weights and Measures, which constructed accurate copies of the metre and kilogram standards for all the contracting States. It retained and preserves those copies of the standards which most nearly approached the original standards, and it carries out the work required for the maintenance of its standards together with the periodical verification of the various national copies. Since 1875 a number of additional countries have subscribed to the Convention, including Great Britain, which took this step in 1884 on the understanding that the country was not thereby committed to the adoption of the metric system. The number of subscribing States is now thirty. The metric system is legal (on a permissive basis) in the United Kingdom, but is not used in trading to any extent. Propaganda has been carried on for a considerable period, notably by the Decimal Association, for the adoption of the metric system of weights and measures in this country. The subject has been considered by a number of Government Committees and other official bodies from time to time, and a note summarising the conclusions reached is appended (p. 283). It will be seen that the balance of opinion throughout has been adverse, as was also the recommendation of the latest Committee to consider the subject, the Committee on Commercial and Industrial Policy after the War, whose report was published in 1918 (Cmd. 9035.) It is understood that in recent years the Association, while still maintaining that the full benefit of the metric system can only be secured by adopting it in its entirety, has formulated proposals for the gradual and piecemeal introduction of the system, the first instalment suggested being an alteration of the gallon to the extent required for making it exactly equal to four litres.

It may be mentioned that for scientific as contrasted with trading operations the system based on the metric units of the centimetre and the gramme together with the second is employed very widely even in countries which do not otherwise employ the metric system. The standard units of electricity are founded on this system and their material representations are used internationally as the basis of commercial transactions.

The international position as regards coinage is not the same as that relating to weights and measures, as the use of many different coinages throughout the world is customary. There is, however, a very considerable degree of uniformity throughout the British Empire, and the dollar used in the United States, Canada and Newfoundland is of uniform par value. Moreover, before the war, gold and silver coins of uniform value (though not with identical names) were used in a number of European countries (originally France, Belgium, Italy and Switzerland, and later others such as Greece, Roumania, Serbia and Spain) under the auspices of the Latin Monetary Union; and these coins were in practice interchangeable to some extent among the countries concerned. Similarly, gold and silver coins of uniform value were used in Denmark, Norway and Sweden under the Scandinavian Union. The practical utility of these arrangements has clearly been impaired by the depreciation which since the war has affected in varying degree the exchange values of the currencies of these countries; and the clauses of the Latin and Scandinavian Unions relating to silver coins were practically abrogated by agreements made in 1921 and 1923 respectively. While some of the new States which arose in Europe as the result of the war adopted standard coins of the nominal par value of the French franc, others adopted coinages of their own which were different from those of any other country. It is true that in most countries of any importance outside the British Empire the coinage is on the decimal system, and the objects of the Decimal Association in this country have included the adoption of that system here, the precise method now advocated being the decimalisation of the shilling at its existing value. Proposals for decimalising the coinage have been considered by a number of Commissions and Committees during the last hundred years, but, except for the introduction of the florin about the middle of the 19th century, no action has been taken in the matter; and the latest Committee to consider the subject, namely, the Committee on Commercial and Industrial Policy after the War, which reported in 1918, made an adverse recommendation (see Annex 2, p. 285, for further information).

The only other principal unit which has an important international aspect is that of time, and there is practically complete uniformity as regards the day and its division into hours, minutes and seconds, and a large measure of uniformity as regards the duration of the year and its division into months and weeks. There are, of course, a number of different systems in use as regards the date of beginning each successive year or the point in time from which the years within the era are numbered; and in addition the Mohammedan year differs from the Christian year both in length and method of division. As regards the Christian year, the desirability from the point of view of industry and commerce of substituting a fixed for the present variable date of Easter (and consequently Whitsuntide) has been the subject of discussion for many years. The "reform"

of the calendar in this and other respects has been under investigation by a special Committee set up by the League of Nations in 1924.* Some lack of international uniformity in the reckoning of time has arisen in recent years through the adoption of "summer time" in the United Kingdom, which involved an alteration in the reading of the clock in this country as compared with neighbouring European countries. Even when some of these countries also adopted the summer time system, the detailed application of it varied from one country to another. Efforts to abolish this variation have, however, been attended with considerable success.

Standardisation in General.

It is now proposed to describe the position as to the preparation and application of standard specifications of size, quality, performance, etc. Unlike the standard units of measurement dealt with above, the standard specifications which are now to be discussed are not essentially a matter for Governmental action; and it will be seen that so far as this country is concerned the greater part of the field lies outside the scope of such action. The standard specifications which are prescribed and enforced by the Government are concerned in the main with preventing frauds (particularly, but not exclusively, in the sale of foodstuffs) which cannot easily be detected by the public, and with securing the safety of life, for instance at sea.

Standard Specifications prescribed by Government.

As examples of legislation for maintaining the quality of goods for consumption or use mention may be made of the Food and Drugs Acts of 1875, 1879 and 1899, the Margarine Act of 1887, the Butter and Margarine Act of 1907, the Public Health Acts, and the various Milk and Dairies Acts administered by the local authorities and partly also by the Ministry of Health. Generally speaking, these Acts deal with adulteration in food and drugs for human consumption and require that articles sold shall comply with certain minimum standards. The office of the Government Chemist is largely used for making tests required for the purpose of legislation of this kind. Examples of similar legislation relating to articles other than foodstuffs can be found in the long series of statutes relating to gold and silver plate, which require articles sold as gold or silver to comply with prescribed standards, and provide for the assaying of such articles by the Assay Offices in London and elsewhere, and the hallmarking of those articles which comply. The Assay Offices are not Government establishments, but were established, and are maintained, by a Goldsmiths' Company or similar organisation in pursuance of Royal charters or special Acts of Parliament.

* The Committee issued a Report in 1926 stating, as regards Easter, that its present variability has an unfavourable influence on a number of industries, and suggesting that its date should be fixed on the Sunday following the second Saturday in April each year.

As an example of the standards prescribed by the Government for securing safety of life, reference may be made to the regulations issued by the Board of Trade, under the Merchant Shipping Acts, as to the hulls, machinery, fire-extinguishing appliances, and the general equipment of passenger vessels, and as to the life-saving appliances, navigation lights, anchors and cables of passenger and non-passenger vessels. The requirements are enforced by officers of the Department throughout the United Kingdom, who undertake the survey during construction of new passenger vessels and the periodical surveys subsequently to ensure that the required standard is maintained. With regard to ships' navigation lights, which are required to comply with International Regulations for preventing collisions at sea, the Board of Trade have specified certain conditions of approval which include definite standards of size, light distribution, screening, etc., also stringent tests at the National Physical Laboratory of sample lanterns made by manufacturers who desire approval of their lanterns. In the case of anchors and cables for ships, the tests required by the Anchors and Chain Cables Act, 1899, are made at proving houses maintained by Lloyd's Register of Shipping under licence from and certification by the Board of Trade.

An example of another kind is the Gun Barrel Proof Act, 1868, which requires the barrels of all rifles, shot guns and other small arms for sale in or exportation from this country, to be tested at a public Proof House in accordance with rules issued by the Proof Houses and approved by the War Office. The Proof Houses are maintained by the Gunmakers' Companies in Birmingham and London.

Apart from those instances where standard specifications are compulsorily prescribed, a certain number of specifications are issued by the purchasing Departments of the Government for the guidance of contractors Where the Government Department is the main purchaser of any commodity, it is clear that the specifications it issues must largely govern the manufacture or production of that commodity In some cases, different Departments have hitherto had different specifications for similar materials or goods, but a Committee called the Technical Co-ordinating Committee on General Stores has been set up by the Government for the purpose of unifying the specifications so far as possible. The British Engineering Standards Association, to which reference is made below, is co-operating in the work of this Committee, thus bringing to bear actual manufacturing experience on the formulation of Government specifications, a process which cannot fail to be of great benefit both for industry and for the State.

Voluntary Standardisation.

As indicated above, standardisation in the sense now under discussion is not mainly a matter of Government action, as the process can be, and is, applied, through voluntary agreement of those

concerned, to many departments of commerce and industry.* For example, in the marketing of certain varieties of natural produce (wheat, cotton, etc.), recognised grades have been established for the convenience of sellers and buyers and to facilitate market operations generally. It is, however, in connection with manufacturing industry that standardisation has its chief application, and here it is generally equivalent to pattern unification. In these days, when standard screws and bolts for replacement on ordinary domestic appliances may be bought from any ironmonger, it is hard to realise that prior to the early part of the nineteenth century screw threads were in the main cut by hand by chipping and filing, every screw was different from every other, nuts and bolts had to be paired by specific fitting, and replacement in the ordinary sense was impossible. It was not until Henry Maudslay and his pupil, Joseph Clement, had devised and constructed reasonably efficient appliances for making screw threads in quantity, that it became possible to effect the standardisation which was afterwards associated with the name of another of Maudslay's pupils, Joseph Whitworth.

Standardisation or pattern unification may obviously either be adopted by individual manufacturers, each of whom may have his own pattern or specification; or, alternatively, all or the majority of the manufacturers of a certain article may agree on the specification which they will employ, the result being that they all produce substantially similar products. While the full advantages of standardisation from the point of view of the manufacturer, dealer and user can, as a rule, be obtained only by the general adoption of specifications, considerable advantages and economies can be secured by the use by individual manufacturers of their own "standard" specifications; and this applies even in comparatively small works not operating on a so-called "mass production" scale, i.e. operating on a scale which does not depend fundamentally on the use of special purpose machines. In addition to the mechanical advantages involved, this individual standardisation renders possible proper works costing systems and proper work progress sheets and routing systems. While pattern unification thus has advantages even in small scale production, it becomes absolutely essential when so-called "mass" production is involved and where parts are produced on special purpose machines. To a considerable extent, standardisation automatically follows the adoption of such productive methods; for instance, the cartridge cases turned out on a given battery of presses are to a large extent automatically standard until the dies commence to wear. Nevertheless, specific efforts are required in order to standardise and to maintain standards. The assembly shop

* It is also applicable to art, as exemplified by the establishment of a definite "concert pitch," for the tuning of musical instruments, though complete uniformity in this matter has not yet been established; and to sport, as when the limits of size or weight of cricket balls, golf balls, etc., is prescribed.

could never cope with its task if it were burdened with either "fitting" or selective assembly. Examples of articles manufactured by these methods are the popular motor car, the sewing machine, and the rifle.

The fact that "mass" production is necessarily associated with standardisation has resulted in a tendency to credit to standardisation all the cost reductions which are rendered possible by large scale production. The two economies are however distinct, and it must not be believed that standardisation alone can secure the advantages derivable only from production on such a scale as to justify the installation of special purpose tools and machines. It is even quite possible that the circumstances of "mass production" will necessitate departure from the general standard; and that the existence of one or more individual large manufacturers who have adopted standards of their own will hamper or prevent the preparation and adoption of standard specifications by the whole industry.

It should, of course, be pointed out that standardisation is not necessarily practicable or desirable in all branches of manufacture. For example, change and variation from standard are often essential in order to gain or retain the world's markets, and standardisation is, therefore, probably more difficult to apply to the full extent when industries are producing goods for export to various parts of the world each one of which may have its own necessary or customary requirements, than when they are working mainly for a large domestic market. Again, in the case of goods (e.g. some classes of textiles) where style and artistic quality are important features, the makers must necessarily have regard to the variations of taste and artistic standards not only as between one country and another, but as between buyers in the same country, and the application of the practice of standardisation to their products is consequently subject to considerable limitations.

By far the most important work in connection with voluntary standardisation, or pattern unification, is that done by the British Engineering, Standards Association, the constitution and work of which are described in a separate memorandum (see p. 288). The Association is not in any sense a Government organisation, although it receives annual contributions from the British Government and other official sources, includes on its main Committee certain Government representatives, and receives technical assistance from the National Physical Laboratory and other Government Departments. It is primarily a joint body formed by the professional organisations in the engineering and shipbuilding industries; and its scope extends to the whole of the engineering and allied industries, a phrase the interpretation of which includes such items as cement; wire ropes; timber and "dopes" (for aircraft); chemical fire extinguishers; and petroleum products. It derives the great bulk of its funds from industry, and it takes up the preparation of standard specifications

only at the request of the interests concerned. While such a constitution may expose a standardising organisation to certain obvious difficulties, the Association has succeeded in attaining a high standard of authority, and the quality and independence of the standard specifications which it issues are universally acknowledged. It is sometimes urged against standardisation that it involves essentially the suppression of development. Obviously, standardisation by an inexperienced or ill-balanced organisation might well be disastrous, but as the specifications of the British Engineering Standards Association are drafted by representatives of all sections of the trades concerned the danger is largely avoided. Moreover, the specifications are not absolutely final. They are subjected to regular and periodical review and can be and are revised when the need arises. In any case, though the issue of a standard specification may render it somewhat more difficult to secure a product to a special design, it does not render such a course impossible.

Although the standards issued by the British Engineering Standards Association have been determined only after the fullest consultation between representatives of the manufacturers and users, and are, in fact, " agreed " standards, they have not been adopted to the extent originally hoped for, as a basis of the specifications issued by the users when inviting tenders and placing orders. This situation is to be ascribed no doubt in part to the idiosyncrasies of individual buyers or their technical advisers and to a reluctance to modify existing practice, but it is also largely due to failure to realise the fact that the advantages of standardisation are bilateral and accrue as much to users as to makers. The work of the British Engineering Standards Association, however, and the example set by the Government in reducing the number of varieties of the commodities purchased by it in large quantities are having a substantial effect, and there is reason to believe that both the purchasing authorities and the trade interests concerned are disposed to take a much more active interest in the matter than they have hitherto done.

As regards standardisation in industries other than engineering, examples can be quoted where stock sizes are customarily recognised throughout an industry (e.g., in the building trade, the sizes of roofing tiles, slates, sheet glass, etc.); and in other instances, organisations (sometimes not primarily concerned with standardisation) have established widely recognised and useful standards. The General Council of Medical Education and Registration issues periodically the British Pharmacopoeia, which stipulates in detail the standards to which various chemicals and drugs should conform for use in medicine. In 1924 the Manchester Chamber of Commerce Testing House prepared, at the request of the Ministry of Health, a standard sample of absorbent cotton-wool complying with the specification in the British Pharmaceutical Codex, and this sample is available at the Testing House for the guidance of manufacturers, and also as the official standard in cases

of dispute. The Institute of Petroleum Technologists has recently issued specifications for the testing of petroleum and its products and of the instruments used in the processes; and still more recently a Committee working under the auspices of the Institute of Chemistry has issued a specification in respect of chemical glassware. This particular institution has a special Standards Sub-committee dealing with the question of the advisability of preparing and issuing standard chemical samples, and it formulates standards of purity for special research and reagent chemicals which are submitted periodically to the Union Internationale (of chemical societies). Four standard sizes of bricks were established by a Committee appointed in 1904 by the Royal Institute of British Architects in conjunction with the Brickmakers' Association and the Institution of Civil Engineers. Some further examples of standardisation in other industries are mentioned in the section on Testing, Certification and Marking on p. 282.

There are a certain number of standard specifications issued by organisations not under Government control, which have a semi-compulsory character in the sense that they must be complied with in order that the product concerned may qualify for some certificate or other indication of quality required for practical purposes. The best example of this is perhaps found in the work of the shipping classification societies (Lloyd's Register, the British Corporation and the Bureau Veritas) which has grown out of the demand by underwriters that they should have some independent guarantee of the satisfactory condition of vessels for which insurance policies were required. The societies undertake the survey of merchant ships (both at the time of construction and at regular intervals thereafter) by their staffs of surveyors with a view to certifying the sound construction and satisfactory condition of the ship, including its machinery and equipment; and for this purpose they issue regulations governing the survey. As mentioned above, the Board of Trade issue similar regulations for the survey of passenger steamers; and in the interests of uniformity, standard conditions for the design and construction of marine boilers (cylindrical and water tube) and standard conditions and rules for shafts of marine steam engines were drawn up in 1920–1923, and adopted by the Board of Trade and the Classification Societies. These standard rules also cover the specification and tests of the material from which the boilers and machinery must be made.

To some extent the resources of Government Departments have been utilised in the preparation of standard specifications voluntarily applicable to industrial production or manufacture. In particular, the National Physical Laboratory has done much work directed to the establishment of satisfactory standards of quality and performance. By way of example may be cited its researches on road

wear and road materials for the Ministry of Transport, its work on thermometers and thermometry, and work such as that which has led to the development of the various gear testing machines (for testing the perfection of automobile and similar gear wheels) now in operation in the Department. More or less recently the National Physical Laboratory has been engaged in preparing certain reference samples of material as comparison standards for use by analysts and others. A range of British iron and steel standardised samples has been prepared through the co-operation of the Iron and Steel Institute and it is likely that this work will be extended.

For the purpose of applying standard specifications, whether national or individual, to the process of manufacture, instruments of special accuracy are often required, particularly gauges. In this connection reference should be made to the work done by the National Physical Laboratory, which tests numerous varieties of measuring appliances and instruments used in science and industry, e.g., micrometers, engineering precision gauges, lathe lead screws and other engineers' appliances, glass burettes and pipettes, etc. for chemical work. Investigations have also been made at the Laboratory as to the best methods of preparing and manufacturing standards, and the work done in connection with the preparation of standard block gauges and end reference bars has been of special importance.

Simplification.

Before concluding this section of the memorandum, a brief reference should be made to the question of simplification. This term has come into use in the last few years, particularly in the United States of America, where it is used to describe the process of securing "the reduction of variety in sizes, dimensions and immaterial difference in everyday commodities" (see Memorandum, page 299). The movement is clearly an example of standardisation or pattern unification, as described above. As an example of simplification arrangements recently adopted in this country, reference may be made to the manufacture and sale of paper.* Before the year 1925 there was no scheme of co-ordination as regards sizes and methods of dealing in paper. Although it was sold by names denoting various sizes (e.g. foolscap, demy, medium), these bore no fixed relation to each other and there was no certainty as to the exact sizes denoted by the various names. As regards methods of selling, paper was sold by the ream, which might consist of 472, 480, 500, 504, 508, 512 or 516 sheets, usually according to the class of paper, though the same class of paper could often be obtained in reams which varied considerably in the number of sheets they contained. In these circumstances, H.M. Stationery Office, which is one of the largest publishers in the world and consequently uses a large proportion of

* The information which follows has been obtained partly from H.M. Stationery Office and partly from an article by Mr. W. Howard Hazell in *The Times Trade and Engineering Supplement* of 25th July, 1925.

the tonnage of printing paper, other than newsprint, produced in the British Isles, decided to investigate the subject ; and the Controller appointed a Committee in March, 1924, to consider how far it was reasonably possible to reduce to a minimum by means of the standardisation of sizes, substances and colours of papers, the varieties of paper to be held in stock. The Committee considered certain Continental schemes of standardisation, but could not recommend their adoption in view of the very drastic changes which would have been necessary, involving in some instances legislation in order to change the size of certain established parliamentary and legal publications. As from the 1st April, 1925, however, the following changes were made :—

(1) The Stationery Office stock of 511 different items of paper, comprising 137 substances, was standardised to 349 items and 38 substances ; and the number of colours was reduced from 88 to 36.

(2) Standard sizes of writing and printing papers were fixed.

(3) Substances were expressed in grammes per square metre instead of in lbs. per ream.

(4) Quires were abolished ; and after an interim period in which reams of 500 sheets were substituted for 480 sheets, the term " ream " was finally abolished on 1st April, 1926, and purchases are now made per 1,000 sheets only, and in packages of 500 or 1,000 sheets according to the size and weight of paper.

Paper makers who tender for Stationery Office requirements have not raised any difficulty with regard to these somewhat drastic changes and the printing contractors have likewise fallen into line. As all paper required for Government use is manufactured in British mills on direct orders from the Stationery Office, there are no complications such as would arise if paper were ordered from mills in foreign countries where a different system obtains.

Meanwhile certain associations in the industry had also been investigating the subject, with the result that an agreement was made in 1925 between the Federation of Master Printers of Great Britain and Ireland and the National Association of Wholesale Stationers. Here again it was not found possible to make an entirely new start in the matter of size, as printing and other machines, books, library shelves and many other arrangements are based on the existing sizes, and could not be changed without incurring a prohibitive expense. It was, therefore, determined to take the existing sizes and to agree on standards. Under the new standards adopted, a paper sold by name such as foolscap, demy, etc., will always be of the standard size, and any " off-size " paper will be described by its measurement in inches, and not by name. Furthermore, all papers will be sold per thousand sheets and packed in thousands, reams of 500 or packages of 250, according to the size and weight of the paper.

As the printer sells his products in thousands this will greatly facilitate his calculations and will obviate the opportunities of error which were frequent under the old system of a variable ream.

Another anomaly dealt with by the agreement is that card or board was previously sold per gross and packed in grosses or sometimes in hundreds. This merely introduced another series of calculations, and in the new standardisation scheme cards will be bought and sold in thousands and packed in hundreds, or any other decimal number that may be found to be convenient.

International Progress in Standardisation.

Some information as to the progress of standardisation in foreign countries will be found in Annex 3, p. 285, from which it will be seen that the subject is receiving attention in a considerable number of European countries as well as in the United States and Japan.

While, as regards raw materials (notably cotton and wool), some progress has been made towards an international system of grading on the initiative of the United States Government, there is little sign of any general movement towards the international adoption of standard specifications for manufactured articles. There are one or two international organisations which interest themselves in standardisation, such as the International Electro-technical Commission, which concerns itself with the standardisation of the nomenclature and ratings of electrical apparatus and machinery; and, in addition to the International Metric Convention mentioned above, which relates to standard units of measurement, there are a few international conventions for establishing international standards, such as the Convention of 15th July, 1914, on Proof Marks for Gun Barrels, the Convention of 29th November, 1906, regarding the unification of pharmacopoeial formulae for potent drugs, and the Convention of November, 1885, regarding the establishment of a concert pitch. The British Government is a party to the second of these.

Generally speaking, however, the ground is not covered by international organisations or conventions; and while in some cases it may be practicable and desirable to have an international standard, it is very uncertain whether it will be possible to make substantial progress along these lines, as the difficulties to be faced are very great. The various institutions interested in standardisation, however, endeavour to keep abreast of what similar bodies operating in other countries are doing. So far as industrial standardisation of the kind carried on by the British Engineering Standards Association is concerned, contact is maintained among the standardising bodies in the various countries through the International Conference of their Secretaries, who hold meetings from time to time in order to compare notes and discuss matters of common interest. The Conference has no executive functions and any decisions it takes are subject to

review and ratification by the Committees of the various standardising bodies, but experience has shown that it can do much useful work without great expense.

So far as the applicability of British standard specifications to trade with countries using the metric system is concerned, it may be mentioned that the standard specifications of the British Engineering Standards Association are issued with the approximate equivalent metric measures, and it has been proposed that in some cases special metric standards (e.g. for light steel sections) might be set up in addition to the existing standard specifications.

Whatever the future may hold as regards international standardisation, considerable progress is being made in the adoption of uniform specifications throughout the Empire, and a brief note on this subject is appended (Annex 4, p. 287). A sub-committee of the Imperial Conference held in 1926 drew up a report on the matter and the Conference passed the following resolution :—

> "The Imperial Conference, recognizing the advantages of standardisation in its widest sense both to producers and to consumers, and appreciating that when it is practicable to adopt standards common to the Empire these advantages are augmented and great benefit results to trade within the Empire and Empire trade generally, recommends to the favourable consideration of the several Governments of the Empire that they should take steps to promote the further development of standardisation, should arrange for the exchange of information with the other parts of the Empire, and, when common standards are possible and mutually advantageous, should co-operate with the other parts of the Empire in regard thereto."

The incentive towards the international adoption of standards or the reciprocal recognition of national standards is particularly obvious where compliance is a necessary condition of securing the entry of goods into particular markets. In this connection the case of merchant shipping is of particular interest. Obvious inconvenience would be caused if ships passing from one country to another had to comply with different regulations in the ports of each, and some progress has been made by agreement between Governments regarding safety regulations applicable to shipping. Mainly as a result of provisions contained in the Merchant Shipping Act, 1906, which extended many of the British safety regulations to foreign ships coming to this country, agreements have been made between the British Government and the Governments of certain foreign countries for the mutual recognition of their respective passenger certificates, which are issued to passenger steamers to certify that they have been officially surveyed and comply with the regulations. Similar international agreements have been made in connection with loadline regulations. While the Classification Societies referred to above do not, generally speaking, follow a common code of regulations, each is

of international scope, and applies its survey and regulations to ships of all nations, for which purpose a staff of surveyors is maintained all over the world.

Testing, Certification, and Marking.

In conclusion, the question of testing articles which purport to comply with a standard specification requires a brief reference. Such testing clearly forms part of the enforcement of a compulsory standard, and it may sometimes be involved in the case of standards voluntarily adopted. As has already been indicated, there exist in this country a number of State or other public institutions which carry out tests of various kinds and reference has already been made to the work of this character performed by the Board of Trade, the National Physical Laboratory, the Government Chemist, Lloyd's Proving Houses, the Assay Offices, etc. Other public organisations which conduct tests are the Bradford Conditioning House and the Testing Department of the Manchester Chamber of Commerce, which devote their attention mainly to textiles, and the Birmingham Corporation Laboratory. It should be observed, however, that certification or marking by one of these testing bodies does not necessarily tend to standardisation in the sense of pattern unification unless the test includes the application of some standard specification. It should also be observed that most of the testing bodies mentioned are of limited scope. In view of the lack of a generally recognised testing authority in this country for certifying compliance with standard specifications, it has been proposed that a national proving house should be established to undertake this work. This was urged as of special importance to the electrical industry, and it was suggested that the relevant industrial institutes together with the corresponding professional bodies should unite to set up the organisation with the moral support of the Government. So far, however, the proposal has not resulted in action, and certain obvious difficulties are extremely serious.

Section 62 of the Trade Marks Act, 1905, introduced for the first time legislation for the registration as trade marks of what are known as standardisation marks, that is, marks which are to be taken as warranties or certificates of some characteristic or characteristics of the goods to which they are attached The Section, as amended by the Trade Marks Act, 1919, reads as follows :—

> " Where any association or person undertakes to certify the origin, material, mode of manufacture, quality, accuracy or other characteristic of any goods by mark used upon or in connection with such goods, the Board of Trade, if and so long as they are satisfied that such association or person is competent to certify as aforesaid, may, if they shall judge it to be to the public advantage, permit such association or person to register such mark as a trade mark in respect of such goods, whether or not such association or person be a trading association or trader or possessed of a goodwill in connection with such certifying. When

so registered such trade mark shall be deemed in all respects to be a registered trade mark, and such association or person to be the proprietor thereof, save that such trade mark shall be transmissible or assignable only by permission of the Board of Trade."

Since the year 1905 a considerable number of marks have been registered under this Section, including some intended to indicate that the goods on which they are placed accurately conform to a standard specification laid down by the certifying body or person. Some of these have been registered by testing authorities for application to goods submitted to them for examination, e.g. the mark consisting of the initials N.P.L. which is used by the National Physical Laboratory; and some of the Goldsmiths' Companies have registered the marks used by them for hallmarking gold and silver plate. Some of the marks denoting compliance with a standard specification have on the other hand been registered by associations connected with the industries concerned, with a view to the mark being used by the individual manufacturers. Examples are the marks registered by the Cable Makers' Association for application to electric cables and wire, and by the Society of British Gas Industries for application to gas fittings, gas meters and stoves, etc. Another example is the mark registered by the Scottish Woollen Trade Mark Association for use by Scottish woollen manufacturers as certifying that the goods marked are made in Scotland of all pure wool.

Another industry which has given a good deal of attention to the possibility of using a standard trade mark is the Boot and Shoe Industry, which initiated a standard boot scheme in October, 1919, to carry on voluntarily the principles of the war-time boot arrangements. A standard boot trade mark was registered at that time, but the scheme subsequently broke down, as described in the Report of a Sub-Committee appointed under the machinery of the Profiteering Acts (see Cmd. 1269–1921). Subsequently an attempt was made to secure agreement among the associations of manufacturers and retailers concerned for the use of a minimum specification mark of quality, but the proposals were not put into practice to any considerable extent and the scheme was withdrawn in November, 1922. It is understood that the interests concerned have recently been considering the question of promoting legislation to prevent the sale of boots not complying with certain minimum conditions as to the nature of the materials used.

So far as the standard specifications of the British Engineering Standards Association are concerned, the association has registered a mark or design with which articles manufactured in accordance with its specifications may be impressed, but there appear to be differences of opinion in the various industries as to the advisability of this procedure, and so far the use of the mark has not made much progress.

ANNEX 1.

Export trade of the United Kingdom with countries using the several systems of weights and measures in their trade returns.

Countries using, in their trade returns—	1913.		1925.	
	Value of Exports.	Proportion of Total.	Value of Exports.	Proportion of Total (*a*).
	1,000 £.	Per cent.	1,000 £.	Per cent.
(1) The metric system of weights and measures.	248,493	47·3	352,758	45·6
(2) The British Imperial system.	224,358	42·7	(*a*)384,827	49·8
(3) Other systems ..	52,403	10·0	35,501	4·6
Total ..	525,254	100·0	(*a*) 773,086	100·0

(*a*) Taking account of exports (consignments) to Irish Free State first recorded in 1923.

Notes.—(1) Between 1913 and 1925 Russia, the States, formerly comprised in the Russian Empire, and Greece have adopted for the purpose of their trade returns the metric system of weights and measures in place of previous "national" systems. They have, therefore, been classed in group (3) for 1913 and in group (1) for 1925.

(2) The principal countries which are known to use (*a*) the British Imperial or (*b*) the metric system for their trade returns while retaining national (or even local) systems for internal trade, are respectively (*a*) India ; (*b*) Turkey, Egypt and Sudan, Cuba, Chile and Guatemala.

ANNEX 2.

Recommendations of Committees as to the adoption of (1) *the Metric System of Weights and Measures,* (2) *Decimal Coinage in the United Kingdom.*

(1) *Metric System.*

The metric system was first formally considered in England by a Royal Commission in 1819, which came to the conclusion that the existing subdivision of weights and measures was more convenient for practical purposes than the decimal scale. A Commission, reporting in 1841 on the restoration of the Standards destroyed by fire with the House of Commons, recognised the advantage of the use of a decimal scale in transactions the subject of written accounts, but thought it undesirable to enforce it exclusively. A further Committee in 1843 recommended a decimal system based on the pound weight. The Juries of the Great Exhibition of 1851, and of the Paris Exhibition of 1855, passed resolutions in favour of an international system of weights and measures and coinage. In 1862 a Select Committee was appointed, as a consequence of difficulties encountered in negotiating the details of a Treaty with France in 1860, and it recommended that the use of the metric system should be made legal, but not compulsory until sanctioned by the general conviction of the public.

In 1864 legislation was passed legalising the use of the metric system in contracts, and the Weights and Measures Act, 1878, re-enacted that provision and authorised the Board of Trade to verify metric standards for any lawful purpose not being for the purpose of trade. The Weights and Measures (Metric System) Act, 1897, completed the permissive process by legalising the use of the metric system in trade and authorising the setting up of metric standards. Various Bills introduced about this time to make its use compulsory were rejected or not proceeded with.

In 1884, H.M. Government adhered to the International Metric Convention (involving an annual contribution to the International Bureau of Weights and Measures) on the understanding that they were not committed to the adoption of the metric system; and no legislative steps for the compulsory adoption of the metric system have ever been taken.

Successive Colonial and Imperial Conferences have considered resolutions on the Metric System. The Conference of 1902 accepted a resolution to the effect that "it is advisable to adopt the Metric System of Weights and Measures for use within the Empire, and the Prime Ministers urge the Governments represented at this Conference to give consideration to the question of its early adoption"; but in 1907 and 1917, resolutions on the subject which were tabled on behalf of some of the Dominions were withdrawn in deference to the views of the Mother Country, when the practical difficulties in the way were explained.

The latest Government Committee which has given consideration to the question was the Committee on Commercial and Industrial Policy after the War presided over by the late Lord Balfour of Burleigh. That Committee took evidence on the subject from various persons (including representatives of the Decimal Association), and Chapter X of its report (Cd. 9035), published in 1918, is devoted to the subject. The Committee summarised its conclusions on the subject as follows:—

> "We have considered numerous suggestions for the alteration of our existing Weights and Measures, and in particular the proposal for the compulsory adoption in this country, after a short interval of notice, of the Metric System. We are unable to recommend the adoption of this proposal. We are not satisfied that on the whole the Metric System is theoretically superior to our present system. The main practical advantages claimed for the change are saving of time in education and the conduct of domestic trade and the gain to our export trade resulting from international uniformity. Upon a review of the probable effects of the change upon British trade as a whole, we are satisfied that these results would not be obtained for a very long period, if ever. In our opinion an attempt to make the use of the Metric System universal and obligatory in this country would cause great loss and confusion at a particularly inopportune moment for the sake of distant and doubtful advantages, and, so far from assisting in the re-establishment of British trade after the War, would seriously hamper it.
>
> "We have also considered proposals for the simplification and decimalisation of our existing weights and measures, but we do not think that compulsory legislation for this purpose would be expedient or would be likely to be effective at the present time. We recommend, however, that continued efforts should be made towards the simplification which has already taken place to a considerable extent in the teaching of weights and measures, and that Government Departments and other public Authorities and trade organisations should bear constantly in mind the importance of promoting a corresponding simplification in the actual conduct of trade. We refer also to the importance, already widely recognised, of using decimal subdivisions of our basic units, and of replacing, wherever possible, the present hundredweight and ton by the cental of 100 pounds and the "short-ton" of 2,000 lbs."

(2) *Decimal Coinage.*

The history of this question, so far as the United Kingdom is concerned, is summarised in a Memorandum by Sir John (now Lord) Bradbury, printed as Appendix II to the Final Report of the Committee on Commercial and Industrial Policy after the War (Cd. 9035/1918). The following is an extract from the summary of the Committee's conclusions on the subject, as stated in Chapter 12 of their Report :—

> "The proposals for the introduction of a decimal system of coinage are often closely connected with the question of Weights and Measures, but the decision must be settled upon somewhat different considerations. The change involves at least the alteration of the pound sterling or of the penny, and the majority of us are convinced that the advantages expected are insufficient to justify the risks which would be involved. . .
>
> "The proposal now supported by the Institute of Bankers, the Associated Chambers of Commerce and the Decimal Association, is the decimalisation of the sovereign which would consist of 1,000 mils, the mil being worth 4 per cent. less than the existing farthing. While it would not promote either the unification of the existing coinage systems of the British Empire or the adoption of an international currency, this proposal offers considerable conveniences in account keeping, especially in the case of banks and large commercial firms. But apart from certain secondary objections the crux of the question is the alteration of the value of the penny, and, having regard to the magnitude of the disturbance which this change would cause in the lives of the great body of wage earners, retail shopkeepers and their customers, we are satisfied that the introduction of such a change would be inexpedient at a time when the social, industrial and financial organisation of the country will be faced with numerous and exceptional difficulties."

ANNEX 3.

Industrial standardisation in foreign countries.

Industrial standardisation is being carried on in sixteen different foreign countries, of which fourteen are in Europe, and the other two are the United States of America and Japan. The work in Germany, Holland, Switzerland, and the United States is the most important. One of the most recently formed organisations is that in *Czechoslovakia*, which appears to have obtained very satisfactory support, both financial and technical, from the principal engineering firms in the country.

In the *United States* there are a number of organisations interested in the issue of standard specifications. The Bureau of Standards (in the Department of Commerce), in addition to certain duties in connection with standard units of measurement, plays an important part in the preparation for America of specifications on the lines of those issued by the British Engineering Standards Association. Its duties include "the development, construction, custody and maintenance of reference and working standards and their inter-comparison, improvement and application in science, engineering, industry and commerce," which, with a wide interpretation results in the Bureau being in a large measure a combination of a Standards Department, a National Physical Laboratory, and a Government Chemical Laboratory, in addition to taking a part in the preparation of standard specifications. The American Engineering Standards Committee was formed in 1917 to co-ordinate the work of the existing organisations engaged in formulating engineering standards. Its methods are somewhat different from those of the British Engineering Standards Association, but it carries out similar

work, including standardisation and simplification of raw materials, manufacturing processes and finished products. It is working not only on national but also on international lines, and is stated to be closely co-ordinated with the similar associations in Germany and Switzerland. The Federal Specifications Board, with the co-operation of the Standards Committee, co-ordinates specifications for all Government Departments, and its work may be expected to go far towards eliminating differences between specifications for Government purposes and those for ordinary commercial supplies, thereby saving large sums both to the Government and to industry.

The Division of Simplified Practice in the Department of Commerce* devotes its attention particularly to standardisation of a non-technical nature, with a view to securing efficiency and the elimination of national waste. The latter subject has in recent years received much attention in the United States. An investigation made by a Committee of the Federated American Engineering Societies with Government approval, the report of which was published in 1921 under the title "Waste in Industry," revealed the existence of widespread and, in some cases, very extensive waste of effort in many branches of productive industry; and in addition to encouraging "simplification" the Department of Commerce is taking action in various other directions to secure the elimination of industrial waste. Detailed information as to its activities will be found in a pamphlet published in 1925 by the Government Printing Office, Washington, entitled "Reduction in Prices through the Elimination of Industrial Waste" (extracted from the 13th Annual Report of the Secretary of Commerce).

In addition to these national organisations there appear to be various other organisations of limited scope interested in standardisation in the United States. For example, it is stated that a few years ago there were over twenty-five organisations working on standardisation in the electrical industry alone, and most of these were overlapping. The American Standardisation Committee is, however, doing what it can to co-ordinate the work of the various organisations interested in standardisation, and the various Chambers of Commerce of the United States co-operate in its work.

Two other aspects of standardisation in the United States, one of which is of international importance, may be mentioned. The functions of the Federal Government include standardisation of agricultural products, and the United States Department of Agriculture has taken steps in the last few years to establish cotton standards (i.e. samples of raw cotton of each of the various grades used in market transactions) and has secured the international adoption of these through negotiations with the cotton exchanges at Liverpool, Manchester, Bremen, Havre, etc. More recently, the Department has made proposals with a view to securing that standard specifications of staple (i.e. length of fibre) should be adopted. These proposals have been discussed with representatives of cotton associations in this country and on the Continent, but the discussion did not lead to the acceptance of the proposals. The U.S. Department of Agriculture also took the initiative in securing the adoption of wool standards so far as diameter of fibre is concerned; and, as a result of negotiations with the various British wool trade interests, a unanimous agreement was reached in 1925 setting up twelve standard grades of wool and tops.

The other special aspect of standardisation referred to above is that effected by the Federal Trade Commission which has organised meetings of the interests concerned to agree on standard definitions of trade terms (e.g. "merino.") In endeavouring to eliminate that form of unfair competition which consists in the application of false trade descriptions to goods, it is

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* See Memorandum, p. 299.

obviously a convenience to secure agreement as to the meaning of the trade descriptions commonly used, and it is to this object that the action of the Trade Commission in the matter is directed.*

In *Germany*, the organisation (Normenausschuss der Deutschen Industrie) is independent of the Government and derives its support from contributions from manufacturers and from the sales of its publications. It is stated that, generally speaking, the German manufacturers, probably because of their technical training, appear to take far more interest in industrial standardisation than the generality of firms in this country do, and they make very extensive use of their standardising organisation for the purpose of standardising their manufactures. *Switzerland* and *Holland* (each of which have their own organisations) are both co-operating with Germany, and Switzerland is the centre of the movement for Continental Standardisation on the metric system.

In *France* the arrangements are somewhat different from those in other countries, as the French standardising body, the Comité Permanent de Standardisation, is a body formed by the Government. Its work is primarily for the Government Departments (like that of the British Government Technical Co-ordinating Committee), and it is really not on the same lines as the British Engineering Standards Association or the corresponding standardising organisations in the United States, Germany, or other countries.

Even in those Continental countries where the organisations are more on the lines of the British Standards Association, the work is organised somewhat differently, as the specifications are drawn up to a large extent by the permanent staff in each case, whereas in this country the permanent staff of the British Engineering Standards Association do not pretend to do more than advise a committee representing the interests concerned how to carry out standardisation and help in the detailed preparation of the specifications. Thus the framing of the specification and the responsibility for it rests with the representative committee. In none of the continental countries, except Germany, is any attempt made to deal with standardisation on the same extensive scale as in this country.

ANNEX 4.

Industrial standardisation in the British Dominions.

In *Australia* the Australian Commonwealth Engineering Standards Association was founded in 1922 by the Commonwealth Institute of Science and Industry, the Australian Institution of Engineers, the Australian Institute of Mining and Metallurgy, and the Australian Chemical Institute. It has a Main Committee composed of representatives of these institutions, of the State Governments, and of the Australian Associated Chambers of Commerce, Associated Chambers of Manufacturers, and Bureau of Steel Manufacturers, and appoints sectional committees as required. The Main Committee has decided, as a general policy, that where reasonably practicable, British Engineering Standard Specifications should be adopted, and the regulations lay down that " at the first meeting of a sectional committee the Chairman shall bring under the consideration of members any existing British Standard Specification which covers the material or equipment to be standardised "

* In the United Kingdom, the effect of the Merchandise Marks Act (see p. 423) probably tends to standardise trade descriptions through voluntary agreement or legal decisions ; and in the case of one industry (fancy jewellery) where the matter is of considerable practical importance, the interests concerned, with the support of the Board of Trade, secured the presentation to Parliament in 1926 of a Bill to give legal effect to the definitions of terms like " rolled gold," " gold filled," etc.

Agreement with or departure from British standard specifications is carefully indicated in the specifications issued. Where the specifications adopted are in complete agreement with the British specifications they are issued, with the consent of the British body, as "Australian Standards."

In *South Africa* there is the British Engineering Standards Association (South Africa Branch) working on similar lines, and with the Departments of Mines, Public Works, Railways and Harbours, Posts and Telegraphs, and Navigation, represented upon its Committee. Some few standard specifications have been issued for matters with which the British Engineering Standards Association has not itself dealt, but generally the South African authority adopts the British specifications. Any proposed British specification is communicated to the South African body, and there is generally time for criticisms to be received and considered before the proposed specification is finally issued.

In *New Zealand* there was formed some time ago the British Engineering Standards Association New Zealand Local Committee, which was intended to be in the same relation to the British body as the South African Committee, but it does not appear to have been so active.

In *Canada* there is the Canadian Engineering Standards Association, with which the British Standards Association is in communication. Further, under a Canadian Act passed in 1924, the Canadian Research Association was empowered to establish a Canadian Physical Laboratory similar to that in the United Kingdom, but with the added power of issuing specifications and standardising not merely instruments, but also the products of industry. In view of the economic community of interest between Canada and the United States and the opportunities of intellectual and personal contact between the officers of the Canadian Government and the Bureau of Standards in Washington, it is to be expected that the standards adopted by Canada should conform rather to those of the United States than to those of Great Britain ; and it is understood that the standard specifications issued by the Canadian Engineering Standards Association tend as a rule to be in substantial agreement with those adopted in the United States.

In *India* the standardising body is the Institution of Engineers (India), which has quite generally adopted British Engineering Standards Association specifications. The India Railway Board has, it is understood, recently set up a conference of officials to consider railway specifications, but this body is believed to be dealing at present only with possible revision of the standardisation of locomotives. The Government of India has made considerable use of the British Engineering Standards Association, and makes an annual contribution to its funds.

THE WORK OF THE BRITISH ENGINEERING STANDARDS ASSOCIATION.

[Compiled mainly from information and evidence submitted by the Association.]

Objects, constitution, and procedure.

The British Engineering Standards Association was formed in 1901 under the title "Engineering Standards Committee" by the Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institute of Naval Architects and the Iron and Steel Institute. Shortly after this the Institution of Electrical Engineers joined in the movement. The organisation was incorporated as the British Engineering Standards Association under licence of the Board of Trade in 1918.

The sole executive authority of the Association is vested in the Main Committee, consisting of thirty members, twenty-one of whom are nominated by the five institutions mentioned above together with the Institution of Automobile Engineers; five (including one to represent the Federation of British Industries) are co-opted by the nominated members, and three are nominated by Government Departments. Of these three, one represents the Board of Trade, another the Department of Scientific and Industrial Research and the third is the Director of the National Physical Laboratory.

The Association exists for the benefit of British industry, for the purpose of drawing up British standard specifications for materials, machinery and apparatus for the engineering and allied industries, its object being through simplification and standardisation to eliminate national waste, to facilitate production, to simplify tendering, and to help British industry to meet competition in the world's markets.

The Association has been recognised as maintaining an entirely independent and impartial attitude and has, therefore, more and more become the accepted tribunal for the settlement of all the difficult questions, both technical and industrial, which arise in carrying out standardisation of national scope in the industries which it covers. It cannot, however, be too widely known that the Association does not embark on such work on its own initiative but waits for pressure from outside. It acts generally at the specific request of an authoritative body, such as a representative trade organisation, a technical society or a government department. It has, however, no government control, its only authority being public opinion in the engineering and allied industries. Before appointing a committee to study any subject, the Main Committee assures itself by a representative conference of all interests concerned that there is a consensus of opinion favourable to the proposed work being undertaken and that it is to fill a recognised want.

From its inception, certain definite principles have governed the work of the British Engineering Standards Association, amongst which may be placed in the forefront the community of interest of producer and consumer, who are brought into consultation at the very commencement of any work, this, in fact, being the cornerstone of the movement. The Association is, in effect, a national organisation in the closest touch with industrial requirements and modern technical knowledge.

For the purpose of the consultations and discussions leading to the issue of a new standard specification, the manufacturers concerned act as a rule through their trade organisation. Consultation with the users or consumers is more difficult as they are not usually organised in the same way as manufacturers, but all practicable steps are taken to ascertain and take into account their views.

The British standard specifications are intended to include the technical provisions necessary for the supply of the particular material or apparatus concerned, but do not purport to include all the necessary provisions of a contract. They are of various types, sometimes specifying dimensions only where interchangeability alone is required, sometimes specifying quality of material as well as dimensions, and at other times specifying only standards of performance to give an equitable basis of comparison. There are also specifications for methods of testing, and for terms, definitions, graphical symbols and markings, etc.

It is obvious that the adoption of the standard specifications would be prejudiced if they were too frequently altered; and the revision of a standard which had been widely adopted might render valueless large sums of capital locked up in plant constructed according to the existing specification. The Association would therefore not lightly and without cogent reason undertake the revision of an issued standard; but in order to keep abreast of invention and progress and to prevent crystallisation, the specifications are reviewed periodically and any improvements or modifications desired by industry duly incorporated in a revised edition. It is claimed that the procedure adopted by the Association whereby the specifications are drawn up by responsible representatives of all the interests concerned is that best fitted for securing that the issue of standard specifications has no detrimental effect on invention and progress. Alterations may be, and have been, suggested by consumers or users, and alterations are never made merely because the manufacturers want them unless the other parties concerned also agree.

The main object of industrial standardisation is the saving of waste of time and material involved in the production of a variety of sizes and qualities for one and the same purpose, in fact the elimination of national waste. This object is attained by a process of simplifying and unifying the needs of industry by agreement amongst the producers and consumers and adopting as the basis of the national specifications what is best in present practice, rather than by attempting to set up an ideal, which might be too costly for industry to adopt.

The subjects dealt with by the Association are arranged under the following sections:—Aircraft, Automobile, Chemical Engineering, Civil Engineering (including Road and Building materials), Colliery requisites, Electrical, Mechanical, Metallurgical, Petroleum Products, Ships' materials and fittings, and Transport. The Association includes within its organisation the British National Committee of the International Electro-technical Commission (I.E.C.).

There are some 420 committees, sub-committees and panel-committees, many of them standing committees, representative of different branches of industry, engaged in the work of the

Association ; and over 2,000 engineers and business men throughout the country give their time and experience to this work without fee or recompense. The large spending departments of the Government, who in many cases have rendered signal service, nominate technical officers on most of these committees. In certain cases the purchasing departments of the Government have asked the British Engineering Standards Association to co-operate with them in drawing up specifications for the use of the departments. Such specifications are issued by the departments when for various reasons they cannot be issued by the Association as national standards. Over 200 British standard specifications and reports have been issued by the Association, and, in the majority of cases, have been widely adopted in this country. They have also formed the basis of much of the work of standardisation in the Dominions overseas (see p. 287). In addition to these, some 250 specifications for aircraft materials have been issued by the Association on behalf of the Air Ministry. Nearly 60,000 copies of British standard specifications were sold during 1925, and 20,200 distributed for the Air Ministry.

The Association is not a profit-making concern, and its only expenses are staff salaries, office expenses, and printing, which amount to some £16,000 a year.* Under present arrangements the Association receives an annual grant of 100 guineas from His Majesty's Government, and £500 each from the Government of India and the Crown Agents for the Colonies. It also receives certain payments from Government departments for services rendered. The great bulk of its income, however, is derived from donations and subscriptions, with a smaller amount from the sales of its publications. The subscriptions come mainly from trade organisations, which have considerably increased in number during the past ten or fifteen years and many of which have taken up the question of simplification and standardisation.

The Main Committee is fully alive to the difficulties of the country's overseas trade, and in 1917, with a view to assisting British export trade, it secured from the Treasury a special grant of £10,000 (on condition that an equal sum was contributed by the engineering industry) to enable it to commence the organisation overseas of local committees of British engineers and traders, and to carry out the translation into several foreign languages of the principal British standard specifications. The engineering industry contributed £14,000 for these purposes. Local committees have been established in Spain, South America, China, India, Australia, New Zealand, South Africa and Canada, and thousands of copies of British standard specifications (in the translated editions, where desirable)

* The total annual cost of the Association's work is estimated at about £40,000, if allowance be made for the services rendered and expenses incurred by the 2,000 and more engineers, etc., who assist in the work.

have been placed at their disposal. Valuable assistance in this work has been afforded by the Foreign Office, the Department of Overseas Trade, and the various British Chambers of Commerce. Unfortunately, however, owing to the Association having practically no further funds at its disposal for this purpose, this branch of the activities, so well commenced, must lapse unless other arrangements are made.

The paramount importance to commercial prosperity of industrial standardisation is being more and more recognised, especially in all producing countries; and permanent organisations for this purpose are in existence in Australia, Canada, India and South Africa, with which the Association is directly connected, as well as in Austria, Belgium, Czechoslovakia, Denmark, France, Germany, Holland, Hungary, Italy, Japan, Norway, Poland, Russia, Sweden, Switzerland and the United States of America.

Economies and advantages of standardisation.

In support of its work, the Association calls attention to the numerous and important economies and advantages to be derived from standardisation.

Productive capacity.—The reduction in the number of types and sizes brought about by national simplification increases the productive capacity of existing plants by reducing the number of interruptions in manufacturing processes necessitated by changing over from one size or design to another (for example, changing heavy rolls in the rolling mills, changing automatic tools). It also makes possible the more extended use of specially designed labour-saving devices, and thus not only further increases productive capacity but may in some cases promote specialisation of manufacture with consequent reduction in price. In the assembling of machinery or machines, the amount of time and hand labour required is very much diminished by the practice of standardisation, as standardised parts do not require fitting; and this obviously leads to an increase in productive capacity.

Continuity and steadiness of production and employment.—With a reasonable measure of agreed national standardisation it is possible for the producer to manufacture steadily and continuously to his average demand, the peaks of demand being met from stock, and employment being continuous in slack times to replenish the stock.

Elimination of waste of material.—So far as standardisation can be applied to the production of material, the producer reaps many of the advantages already mentioned and avoids deterioration or damage due to the necessity of holding large stocks of many small varieties of the material. Further, the user of the material should get cheaper and better supplies and avoid waste due to bad or uncertain quality.

Reduction in capital charges.—National simplification brings about a substantial reduction in capital and overhead charges in many ways, amongst which are the following :—

(*a*) Reduction in cost of plant and machinery.

(*b*) Reduction in cost of maintenance.

(*c*) Reduction in value of stocks of raw material.

(*d*) Reduction in cost of testing and inspection

(*e*) Reduction in technical staff devoted to routine production.

(*f*) Reduction of capital locked up outside the factory.

(*g*) Reduction in amount of storage space required.

Advantages to dealers.—Many of the advantages enumerated in this section, and particularly those mentioned under the heading of " Reduction in capital charges," are applicable to dealers, both wholesale and retail, as well as to manufacturers. A saving of even a small percentage of the value of stocks held by retailers and wholesalers would obviously represent a very large sum, and any saving thus secured by standardisation should be reflected in reduced price and increased consumption, with favourable reactions throughout the whole of the country. For example, it has been authoritatively estimated that the value of the stock held in ironmongers' shops in this country cannot be less than about £16,000,000, and this is probably almost duplicated in the wholesale houses, in addition to the stocks held by builders and users generally. It is suggested that at least 20 per cent. of this amount might be saved by a small measure of national simplification. Similarly, the value of the stocks of electric lamps in this country outside the factories has been estimated as not less than £4,000,000, and the ultimate effect of the standardisation of electrical pressures now being brought about through the activities of the British Engineering Standards Association should enable this stock to be gradually reduced by at least one half. Another sphere in which it is believed that considerable economies could be effected by means of standardisation is that of transport, as regards, for example, packages or containers for certain kinds of goods, and the classes of articles stocked by ships' chandlers throughout the world.

Advantages to users.—Obviously many of the advantages and economies mentioned above may react to the benefit of users and consumers of standardised articles, who also derive certain other advantages from standardisation. For example, it renders equitable comparisons of tenders possible without undue correspondence and wasted effort, and it renders it much easier for buyers overseas to

place orders with the assurance of getting what they require. By allowing of interchangeability it also renders generally available to users the individual products of many manufacturers; and, so far as component parts of machines are concerned, these when standardised can be obtained with the certainty of being suitable and can be assembled without the necessity of fitting. This is obviously an important matter from the point of view of overseas trade, where it is much easier for merchants to carry a satisfactory stock of spare parts if these are standardised, thus saving delay in supply to customers when they are required.

Examples.—Some examples may be given to illustrate the economies and advantages secured through the work of the Association. The first Standards Committee was formed to deal specifically with iron and steel sections. It is impossible to say how many different sections were being produced prior to the committee's work, but they certainly totalled many hundreds. The first specifications issued reduced the total number to 175, and the number has since been reduced to 113. The saving due to this reduction has been placed at 5*s.* per ton over all sections rolled, estimated roughly to amount to £1,000,000 a year. Again, as a result of standardising tram rails it is now necessary to roll only four different sections instead of seventy-five; or, in other words, seventy-one were unnecessarily produced before standardisation. Even as far back as 1914, 95 per cent. of the output of five of the largest rolling mills in the United Kingdom was produced to British Engineering Standards Association standards. More recently a single specification in the electrical industry had the effect of reducing the value of the goods which one company had previously to keep in stock by £10,000, thus enabling them to effect a continuing saving of £500 a year.

Certification.

The question of the certification of manufactured goods as complying with the standard specifications is a matter which presents some difficulty, but the Association have registered the letters B E S A as a trade mark, and they have also registered a design. Manufacturers who comply with the necessary conditions are being licensed to mark their goods with the letters B E S A or the design in conjunction with the number and date of issue of the specification, as an indication that the goods have been made in accordance with a standard specification. The Association is proceeding cautiously and tentatively in this matter, as different branches of industry appear to have different views as regards the advisability of the system of marking. It is not intended that the mark should be used by foreign manufacturers even if they manufacture their goods in accordance with the British Standard specification.

Attitude of industry to the work of the Association.

Although a large number of engineers throughout the country, including the consulting engineers, support the idea of industrial standardisation carried out with proper safeguards, the business community as a whole does not appear fully to appreciate its value, and the work of the British Engineering Standards Association is hampered by lack of funds. Its experience is that there are many branches of industry which are still bound by tradition and drift along with an enormous number of spare parts, making no attempt to simplify. As an example of such national waste, the case is cited of pit tub wheels, where one firm has over 3,000 patterns in stock differing in many cases by a mere fraction of an inch, whereas some fifty would, according to them, meet the needs of the whole country. In the coal industry generally, standardisation has not hitherto received very much attention, but the coal owners approached the Association a year or two ago with a view to the question of standardising colliery requisites being taken up, and have undertaken to bear the necessary expense involved. Considerable progress has already been made, steel arch girders and colliery light rails having now been simplified or standardised. An instance where proposals for standardisation were not favoured by the industry is the case of steel barrels and drums used as containers. The position as regards these is said to be chaotic, but when the Standards Association attempted to obtain an agreement for standardisation, the association controlling the manufacture refused to co-operate. More recently, however, the Government Technical Co-ordinating Committee on General Stores have put forward proposals for standards of steel drums and barrels and have asked the Association whether these can be converted into British standards; and the matter is receiving further consideration by the manufacturers.

The Association has endeavoured to carry standardisation into the shipbuilding industry in regard to details in the construction of ships and their machinery, and it has received full support from the shipbuilders. The benefits of standardisation in shipbuilding material are obvious, and the standard specifications for boiler and forging material, as well as those for small pieces of apparatus which can be made cheaply in quantity, are bound to be of increasing advantage in proportion to their use; but up to the present shipowners generally have not seen their way as a rule to insist upon compliance with the British Standard Specifications which have, therefore, not come fully into use. On the other hand, the electrical manufacturing industry started systematic simplification and standardisation some twenty years ago, and the work connected with it has occupied something like a quarter of the efforts of the Association during all these years, a fact which the Association suggests cannot be unconnected with the relative prosperity of that

industry as compared with many others during recent years. The Association believes that this country is probably ahead of all other countries in systematic industrial standardisation, though in the realm of simplification more has been done in the United States than here.

As regards the practical application of standard specifications, the practice of the Association when new specifications are being drawn up is to encourage the large trade associations concerned to set up technical committees ; and some of the specifications have been very widely adopted. For example, nearly all the tramway rails and tramway poles throughout the country are made to the British standard specification. In another section of the Association's work, the same is true, for example, of twist drills ; and all the Portland Cement manufactured in this country is made in accordance with the British standard. In addition, a number of the Association's standard specifications are accepted abroad as a reliable guide to good practice.

Influence of standard specifications on overseas trade.

The question of the relation of standardisation to overseas trade is clearly a matter of fundamental importance to British industry, and this is fully recognised by the British Engineering Standards Association. The Association claims that the advantages which follow industrial standardisation all have an important bearing on British overseas trade, and that the adoption of the British standard specifications by purchasers in other countries will not only facilitate business from their point of view, and ensure the supply of satisfactory material, but will also be of great advantage to British manufacturers as the material thus ordered will be that which is most suitable for them to produce as compared with material which has to be made in accordance with either the standard specification of other countries or the special individual specification of the purchaser. It is the view of the Association that, owing to their independent character, national standards are of much greater value in connection with overseas trade than sectional or limited trade standards. One of the most important functions of the British Engineering Standards Association's local committees abroad has been to disseminate the standard specifications drawn up by the Association and to encourage their adoption by Government departments, consulting engineers, and others concerned in the purchase of plant and machinery. Where standard specifications for particular articles have been issued in other manufacturing countries, but no corresponding British specification exists, British manufacturers and traders may find themselves hampered in competition ; and in some cases the local committees abroad, particularly in China and South Africa, have requested that a British standard

specification should be prepared for use by British agents abroad to help them in competing with other national specifications. This was the case, for example, as regards girder bridges, where the specification was drafted at the request of the China Committee; and the same Committee has subsequently asked the Association to set up a British standard specification for locomotive component parts.

Obviously in this connection international competition in important markets becomes to a certain extent a matter of competition between alternative standards. For example, in South America, the British Engineering Standards Association has devoted considerable attention to distributing reliable translations of a number of its specifications in Spanish and Portuguese. It is therefore significant to observe the action taken, through the Pan-American Union, by the American Engineering Standards Committee, with the support of the American Secretary of Commerce, in connection with standardisation in the South American Republics. A Pan-American conference on standardisation was held at Lima in December, 1924, when the retiring Chairman of the American Standards Committee delivered an address urging Pan-American standardisation, in the hope that the American States might handle the problem collectively. At the same time he expressed the view that ultimately standardisation problems would have to be dealt with on an international basis, and stated that the object of the United States was not to secure preference for their standards, but was to see the general prosperity of South America increased as a basis for better commercial relations.

The British Engineering Standards Association holds that the British Standard Specifications are, generally speaking, considerably in advance of the other European or the American standards, being more practical and in many cases superior in quality. Hence, if the British standard specifications are adopted by purchasers abroad, it will be necessary for manufacturers in foreign countries who wish to tender, to bring their machinery or other equipment up to the British standard, and thus competition will be brought to a more equitable basis. At the same time, the Association claims that the needs of export trade are kept in view in the framing of the British standard specifications, which is a necessary consequence of the fact that the manufacturers and other interests concerned are fully represented on the committees which draw them up. The standard specifications are issued with the approximate equivalent metric measures; and in some cases a modification may be permitted in the specification for the purpose of goods intended for export. Moreover, contact is maintained with the corresponding standardising bodies in foreign countries through periodical meetings of the secretaries, which have proved of great value although the conferences

have no executive power; and copies of all the specifications issued by the standardising bodies in other countries are on file in the offices of the British Engineering Standards Association.

Testimonies to the value of British standards in their export trade are given by many large trade associations. The British Electrical and Allied Manufacturers' Association (B.E.A.M.A.) state that the propagation of British standards for electrical machinery recently commenced is vital to British electrical export in all parts of the world. Until British standards became available, British manufacturers had to tender for machinery in accordance with either American or German standards, which forced them to provide for the manufacture of machines differing from established British practice, with consequent increase in price, and, in many cases, considerable loss of business. The Machine Tools Trade Association also have informed the British Engineering Standards Association that great benefits have accrued to their export trade through the issue of British standards for machine tools, which they urge should be translated into Spanish and Portuguese. Further evidence is also forthcoming from industry of the assistance furnished in meeting foreign competition by the issue of certain British standard specifications. This notably is the case in regard to the British standard specification for Portland Cement, which has proved a great factor in strengthening the confidence felt abroad in the high quality of British Portland cement; the British standard specification for electric transformer oils, the issue of which has led to the almost complete disappearance from the English market of American supplies of this material; the forthcoming British standard specifications for steel telegraph and telephone poles, which have been sufficiently in circulation to be provisionally used by British Overseas Telegraph Administrations; the British standard specification for copper wire, the promulgation of which is preventing the adoption of other specifications which in many cases contain requirements which can only be conformed to by foreign products; the British standard specification for copper plates, tubes and rods for locomotive boilers, particularly in the Spanish edition, as nearly all the leading railways in South America are using this specification.

In other cases, for example in regard to aluminium and to material and apparatus used in lighting installations, the industry is suffering from the fact that no British standard exists, and urgently desires the issue and promulgation of a British standard in order that it may be in a position effectively to meet foreign competition.

While neither the value of British standards to British export trade, nor the result of the adoption in foreign countries of other standards, can be estimated in terms of money, there is no doubt that the matter is one of the greatest possible importance, and the Association claims that it is greatly to the loss of British industries that its overseas work is lapsing for lack of funds.

THE SIMPLIFICATION MOVEMENT IN THE UNITED STATES OF AMERICA.

(*Compiled from sources given on page 303.*)

Origin and Objects.

During the war there was set up a Conservation Division of the United States War Industries Board for the purpose of effecting economies in the use of materials and the employment of man power. With this end in view much was done to eliminate unnecessary multiplication of styles, shapes, etc., which had caused heavy additional expense to manufacturers, wholesalers and retailers, and the employment of more numerous forces than were absolutely necessary to handling their production, advertising and distribution. Soon after the termination of hostilities, the activities of the War Industries Board came to an end, and American manufacturers resumed many of the practices temporarily suspended under the influence of the Board. There remained, however, a feeling that the renewed tendency towards the manufacture of great numbers of different styles was wasteful, and in January, 1922, there was established a Division of Simplified Practice in the Bureau of Standards of the Department of Commerce. The object of the Division, according to a Report of its Director, was to develop a nation-wide programme with a view to lending the hand of the Government to the elimination of collective wastes in commerce and industry.

As to the objects of the movement so begun, it has been stated by a recent American writer on the subject that there has been considerable confusion as to the real significance of simplification as differentiated from standardisation, and that, while many consider the two as being synonymous, there is in practice a definite distinction. Simplification, according to this writer, is fundamentally an economic movement based on commercial expediency rather than upon scientific fact, technical research and engineering experiment not being necessary. Simplification, he says, may rightfully be regarded as complementary to standardisation and scientific research, since simplification, while it does not preclude standardisation in any product or in any industry, is preliminary to standardisation because its elementary aspects make it manifestly the proper initial procedure.

The following definition appears in the chapter on Simplified Practice in the 13th Annual Report of the United States Secretary of Commerce: "Simplified practice means the reduction of variety in sizes, dimensions, and immaterial difference in everyday commodities. Its purpose is to eliminate waste, decrease cost, and increase values in production, distribution and consumption. It has nothing to do with style problems or matters of individual creation."

Those who are encouraging and developing the movement believe that the reduction of variety and the simplifying of industrial and commercial practices will decrease stocks and both production and

selling costs and that it will lead to an increase in turnover, stability of employment, promptness of delivery, and in the quality of the product with a consequent increase in the profit of producer, distributor and user.

Procedure.

The Division of Simplified Practice have stated that it is found to be frequently the case that a manufacturer or group of manufacturers wish to eliminate excess sizes or varieties, but feel doubtful of the attitude of distributors or users to such a proposal; in other cases it is found that the distributors desire a reduction of variety if the manufacturers and users will agree; while in yet other cases the user himself would most appreciate a reduction of costs due to a reduction of the number of sizes or varieties manufactured and distributed. The practice adopted is designed to meet any of these cases. The Division, having reason to believe that one of these conditions exists in connection with any industry or any particular article, calls a meeting, ordinarily of the manufacturers alone, and suggests a co-operation in the work of preparing a survey of production and sales of their various commodities. This survey, carried out by someone chosen by the meeting, reveals the varieties produced which are in relatively low demand, and which may profitably be eliminated. It has been stated by the Chamber of Commerce of the United States that in most of the industries which have carried out surveys, it has been found that approximately 80 per cent. of production and sales is on 20 per cent. of the varieties—in other words, 80 per cent of the varieties produced were bringing in only 20 per cent. of the business. When the survey has been completed, and the manufacturers have considered it, a further conference is called by the Department of Commerce, to which are invited the manufacturers, the distributors, and, wherever possible, large consumers of the product in question. At this conference the survey conducted by the manufacturers is placed before the distributors and consumers and discussed in detail from the point of view of each of them. On a simplified schedule being adopted by the conference, a date is set for it to become effective and a Continuing Committee appointed. This comprises representatives of all the interested parties, and is charged with the duty of keeping the schedule under constant review, and making any necessary proposals for its periodic revision.

It will be noted that the Government Department does not attempt to determine or even suggest the simplifications which an industry should adopt. It merely brings together all the interests and by printing a report of the proceedings, publishing the recommendations of the conference, and registering the simplified practice schedule, gives assistance in carrying out such agreement as may be reached. Thus, any scheme of simplified practice is worked out and agreed upon by the persons most intimately affected.

Results.

During the first six months of the activity of the Division of Simplified Practice in the Department of Commerce some 70 industry groups were engaged in working up Simplified Practice recommendations. Prominent among these were the manufacturers of farming equipment, machine tools, small tools, jute products, fabricated structural steel, sheet glass, electric lighting fixtures, etc. According to statements in the American trade press based upon information furnished by the Department of Commerce and, also, to the Bulletin of the Chamber of Commerce of the United States, by the end of 1925 nearly 400 industrial groups had been, or were then being, assisted by the Department of Commerce to eliminate unnecessary varieties, shapes and sizes. The latest report (issued in January, 1926) of H.M. Commercial Counsellor on the Finance, Industry and Commerce of the U.S.A. states that the movement towards Simplified Practice has made remarkable strides in the last few years, and has already resulted in substantial economies in a large number of industries.

The Thirteenth Annual Report, 1925, of the United States Secretary of Commerce, states that over fifty simplifications have been achieved by the industries and trades concerned since the service was inaugurated. This report also states that among these schemes 25 apply to products of iron, steel, and other metals, 8 to lumber, paper and other products of wood 17 to clay, cement, glass and other products of a mineral nature, 4 to textiles, and 2 to commercial documents. The average reduction in varieties in these cases was 73 per cent. A table showing these results in detail appears in the Report and is reprinted as an appendix to this memorandum. One of the instances of Simplified Practice given in the list, which is frequently quoted as showing the advantages of the policy, is the application of the scheme to business documents by means of an agreement for the reduction of forms used in the merchandise warehousing business. The replacement of very numerous varieties of forms by a set of standard forms will, it is claimed save great sums of money previously spent in litigation and in clearing up claims and misunderstandings, in addition to bringing about improvements in office procedure.

As to the adoption of simplified practice recommendations, the report says that 1,200 trade units have endorsed 33 recommendations. These included 57 associations of producers, 86 associations of distributors and 255 associations of consumers, while 386 individual manufacturers, 238 distributors and over 200 consumers have adopted simplified practice methods acting independently of trade associations.

APPENDIX.

Results of Simplified Practice, January, 1921, to October, 1925.

(*Reprinted from the 13th Annual Report of the U.S. Secretary of Commerce.*)

Commodity fields.	Number of sizes or varieties in use.	Number retained.	Per cent. reduction.
Iron, Steel, and their Products.			
Metal lath	125	24	81
Files and rasps	1,351	496	63
Woven-wire fencing	552	69	86
Woven-wire fence packages	2,072	138	94
Range boilers	130	13	90
Hot-water storage tanks	120	14	88
Steel barrels and drums	66	24	64
Forged tools	665	351	47
Plow bolts	1,500	840	44
Steel reinforcing bars	40	11	73
Sheet steel	1,819	263	86
Eaves trough and conductor pipe	21	16	24
Terneplate	9	7	22
Steel lockers	65	17	74
Milling cutters	—	—	35
Tacks and nails, sizes	428	181	58
Tacks and nails, packing weights	423	121	71
Shovels, spades, and scoops	4,460	384	92
Hospital beds :—			
Lengths	33	1	97
Widths	34	1	97
Heights	44	1	98
Beds, metal	78	2	97
Bed springs	78	2	97
Stone, Clay, Glass, and Mineral Products.			
Vitrified paving brick	66	4	94
Face brick (smooth)	37	1	97
Face brick (rough)	38	1	98
Common brick	44	1	98
Hollow building tile	36	19	47
Roofing slate	98	48	51
Blackboard slates	251	25	90
Structural slates	—	—	84
Concrete building units	115	24	80
Sand-lime brick	14	3	79
Hotel chinaware	700	160	77
Cafeteria and lunch-room chinaware	668	177	73
Hospital chinaware	700	113	84
Dining-car chinaware	700	113	84
Milk bottles	49	9	82
Asphalt (grades)	88	9	90
Asbestos paper	14	8	43
Asbestos millboard	10	5	50
Grinding wheels	715,200	255,800	64

Commodity fields.	Number of sizes or varieties in use.	Number retained.	Per cent. reduction.
Wood, Paper, etc.			
Lumber (softwood): Yard sizes and structural timbers.	—	—	60
Paper sheet sizes :—			
Stock sizes, general printing and publishing	—	4	—
Stock sizes, book publishers ..	—	1	—
Forms and letterheads	—	3	—
Box board	244	60	76
Milk-bottle caps	29	1	97
Tissue paper :—			
Roll tissue	13	3	77
Shoe tissue	21	6	72
Grocers' paper bags	6,280	4,700	25
Wood beds	78	4	95
Textiles.			
Mattresses	78	4	95
Blankets	78	12	85
Boxed elastic webbing	19	10	47
Cotton duck	460	94	80
Miscellaneous.			
Builders' hardware :—			
Items	—	—	26
Finishes	—	—	71
Brass lavatory and sink traps ..	1,114	72	94
Loaded shells	4,076	1,758	57
Paint and varnish brushes	480	138	71
Documents.			
Warehouse forms	Thousands	15	—
Invoice forms	Thousands	1	—
Inquiry forms	Thousands	1	—
Purchase order forms	Thousands	1	—

NOTE

This memorandum has been compiled from the following sources :— Note on Simplified Practice (July, 1922), Simplified Practice Recommendations, Nos. 1–49 (1923–1926), and the 13th Annual Report (1925) of the U.S. Secretary of Commerce, all issued by the U.S. Department of Commerce ; Simplification, by A. W. Shaw, published in the Harvard Business Review, July, 1923 ; The Advertising World, October, 1925 ; Report on the Finance, Industry and Commerce of the U.S.A., by the Commercial Counsellor, H.M. Embassy, Washington, January, 1926.

CHAPTER IV.

STATE ASSISTANCE TO RESEARCH IN INDUSTRY.

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STATE ASSISTANCE TO RESEARCH IN INDUSTRY.

(Furnished by the Department of Scientific and Industrial Research.)

Introductory.

Early in the war it became clear that British industries were dependent in many essential respects on foreign sources of supply of raw materials and manufactured commodities, and had fallen behind their foreign rivals (particularly in Germany) in the application of science to the solution of industrial problems and to the development of new products as well as of new and of improved processes of manufacture. A feeling existed that immediate steps should be taken to promote scientific research in industry and that the State should itself assist a national movement with this object. War conditions emphasized the necessity for such a movement. Accordingly in July, 1915, the Government announced the establishment under the Privy Council of a permanent official organisation for the promotion of scientific and industrial research. In December, 1916, the new organisation was established as a separate Government Department.

Although the Department of Scientific and Industrial Research has been in existence now for rather more than ten years, it is doubtful whether the facilities it affords for the conduct of research calculated to lead to results of benefit to industry are sufficiently widely known. The object of this memorandum is to give a short account of the Department's principal activities, including a reference to research carried out at University institutions with financial assistance from the State the work of other Government research establishments, and arrangements for co-operation between the Department and Imperial bodies.

The policy of the Department is that, as far as possible, the industries should be encouraged to organise and conduct their own research in a comprehensive way; and the scheme for *Industrial Research Associations* affords the means whereby assistance can be given to an industry likely to benefit by scientific research if the firms in the industry are prepared to co-operate for that purpose. On the other hand, certain important research work is carried out directly by the State because of its national importance and because it is not suitable for comprehensive attack by private enterprise. Thus, research on the economical use of fuel and the production of new fuels is carried out mainly at the Fuel Research Station, East Greenwich; research on the storage and transport of food at the Low Temperature Research Station at Cambridge; work on the maintenance of all standards forming the basis of measurement and

on the basic problems of metallurgy, engineering, aeronautics and electricity at the National Physical Laboratory, Teddington. Investigations on building materials and methods of construction are undertaken at the Building Research Station; this work is being considerably extended now that the Station has been transferred to its new premises at Watford. A number of chemical investigations which up to the present have had to be distributed over the laboratories of research establishments attached to other Government departments or to Universities will in future be conducted at the Chemical Laboratory at Teddington. While the prime function of the laboratories maintained by the Department is to conduct research required for national and Government as distinct from sectional purposes, it is intended that they should be of the fullest possible use to industrial firms or groups of firms finding themselves confronted by particular scientific problems which cannot be solved by other means.

Successful as the research association scheme has been in many industries, there are industries to which the conditions of the scheme may not be suited. Accordingly, arrangements can generally be made for research to be undertaken on behalf of industries which have not formed research associations, provided they are prepared to contribute adequately to the cost of the work. Further, where research associations have been formed, the Department is frequently able to assist either by carrying out investigations in its own establishments on their behalf, or by arranging for the work to be done in a research establishment maintained by another Government Department. For example, an investigation of the iron-silicon system is being carried out at the National Physical Laboratory on behalf, and at the cost, of the Cast Iron Research Association; while researches on buried cables carried out by the National Physical Laboratory for the Electrical Research Association have led to results of great benefit to the power supply companies. An instance of co-operation involving a research establishment under another Government Department is the work on die castings carried out at Woolwich Research Department. It is significant that the electrical industry, comprising large units which themselves maintain very efficient research laboratories (e.g. the General Electric Company, Henley's Telegraph Works Company, and Metropolitan-Vickers Electrical Company), nevertheless finds it desirable to invite a Government research establishment to undertake certain investigations. There are several reasons for this, of which two may be mentioned. The Government establishment may possess experimental resources or experience which are not readily available elsewhere; or by reason of its independent position it may be well fitted to carry out an investigation the unbiassed results of which will command the confidence of the whole industry. As an illustration, reference may be made to the investigation which was carried out on behalf of the British Non-ferrous Metals Research Association at the National Physical Laboratory, where special facilities were

already available, into the mechanical properties at high temperatures of certain non-ferrous alloys. One of the alloys tested gave results for strength and resistance to "creep" at high temperatures markedly superior to any material, ferrous or non-ferrous, previously tested; and the results commanded confidence to such an extent that the alloy was at once put into commercial production for engineering purposes.

Although, wherever possible, the Department seeks to promote co-operative action within an industry for the purpose of research, it does not confine its help to bodies representing an industry as a whole, or even to groups of firms in an industry. Where the means exist it is willing to carry out, on suitable terms, special investigations of scientific or industrial interest for any outside body or person. Normally, the Department reserves the right to publish the results of investigations entrusted to it, although in special cases investigations may be undertaken on conditions which withhold or defer publication of the results. Where the results are kept confidential the charge made is calculated to cover the full economic cost. Where the results are not confidential a lower charge may be made calculated to cover the maintenance cost only. Where, however, the work is considered to be of sufficient general interest, as much as one-half the normal charge may be remitted, provided the results are held freely available.

Organisation and Progress of Research Associations.

Organisation.—The Government sought in the first place to promote industrial research by a scheme for the establishment of co-operative research associations. Parliament placed a fund of a million sterling at the disposal of the Department of Scientific and Industrial Research, and it was decided, after consultation with manufacturers, that the fund should be expended in the form of contributions towards the income raised by voluntary co-operative associations, to be formed in the various industries, for the purpose of research. The method employed for the purpose was the establishment of research companies, limited by guarantee of a nominal sum (e.g. £5) and working without profit, i.e., without the division of profits among the members in the form of dividends. Firms joining a research association were to receive, *inter alia*, the following privileges :—

(1) The right to put technical questions and to have them answered as fully as possible within the scope of the research organisation.

(2) The right to recommend specific subjects for research and, through the council of the association, to have a voice in the selection of the programme of research.

(3) The right to free or preferential user of any patents resulting from research.

(4) The right to ask for a specific research for their sole benefit at cost price, provided this could be undertaken without detriment to the general programme.

(5) The communication, in convenient form, of the results of researches conducted by the association; the results not to be published except with the consent and approval of the association.

(6) The regular services of an information bureau, by means of which they would be kept in touch with technical developments at home and abroad.

The whole of the results of researches conducted by any research association belong to the association itself, which holds them in trust for the benefit of its members. The Department reserves the right, however, to veto the communication of the results of research to a foreign person or foreign corporation; the right, after consultation with the association concerned, of communicating the results of research to other industries for their use on suitable terms; and the right also to communicate results obtained to other Government Departments. The reservation of the right of veto is merely to safeguard the interests of the taxpayer should the necessity arise. As a matter of fact, the necessity has never arisen, and as far as can now be foreseen is not likely to do so. The official policy is entirely favourable to the free publication of the results of research, provided that the interests of the British industry concerned are not prejudiced and that subscribing firms are given reasonable opportunities for a preferential use of the results.

An essential feature of the scheme is that the associations are given great freedom of action and are at liberty to work out their own schemes of research. In this way a considerable sense of responsibility is engendered. The investigations are directed along the lines which the industry considers most important, and this should help to secure that the results as they come to hand will be utilised in the industry.

Research associations formed by industries under the Government scheme are essentially national bodies. In several instances local groups have been anxious to secure recognition for the purpose of forming research associations under the scheme, but the Department has invariably refused to negotiate with local units except on the clear understanding that membership would be open to all firms in the country connected with the industry. In the adoption of this policy the Department has been actuated by a number of considerations. The most important reason why the Government scheme has not been extended to local groups is that money raised by national taxation must be expended in such a manner as to promote the

national interest and not the interest of one section of the community to the detriment of any other section ; and, if a local association obtained the autonomous powers allowed under the scheme, it would be possible for it to exploit the result of its researches at the expense not only of foreign competitors but of other sections of the industry in this country. The recognition of two or more local associations in the same industry would not overcome this difficulty, since any such association would still be in a position to exact royalties from other firms in the industry and even from members of the other research associations in the industry, notwithstanding that those bodies were also in receipt of a State grant. The establishment of a series of local research associations in an industry would also lead to duplication of effort and increased expenditure. There are also other considerations in favour of confining grants to national bodies. For example, experience has shown that in each industry there is what may be called a minimum desirable annual expenditure upon research. If in any industry the industrial units are small and the sums available for expenditure upon research by individual concerns are likewise small, progress is slow and faith in the value of research consequently shaken. Again, a local section of an industry may be identified with a particular process and, consequently, disposed to view with alarm the development of any alternative process, so that research conducted by such a body would tend to pursue stereotyped lines to the exclusion of possibly more promising lines of development, thus defeating the very object that the Government scheme has in view. The tendency for small groups of firms is to concentrate upon the particular practical problems with which they are immediately confronted rather than to conduct researches into the application of new fundamental scientific knowledge such as are likely to produce a general improvement in industrial technique. The Department also considers it desirable that as many sections of an industry as possible should be brought together in one research association, so that each may understand the problem of the others. An example of the importance of this consideration is provided by the electrical industry. Finally, for general administrative reasons it is desirable that a Government Department should deal with an industry as a whole and not with sectional units.

Finance.—The amount of Government grant received by research associations during the first five years of their existence is normally on the basis of £ for every £ found by members of the associations between certain limits prescribed in each case. The subscriptions paid to research associations by contributing firms are treated as business costs of the firms and are not subject to income tax. The income of the association apart from interest on investments is similarly free of income tax. In exceptional industries which are essential to the existence of larger industries and to the defence of the realm, and in which the cost of research for their maintenance and development is an abnormally large factor in the cost of production,

grants have been made on a scale higher than the £ for £. The scientific instrument making industry fulfils these conditions to a marked degree, and has received special terms ; during the first six years of the existence of the British Scientific Instrument Research Association, grant aid greatly in excess of £ for £ was given, and during the succeeding five years it has been agreed to give a block grant of £10,000 a year provided the subscribing firms find annual sums rising from £1,500 to £2,250.

The Glass Research Association, comprising all sections of the glass trade other than optical glass, was also considered as a special case, because of the importance of research being done on scientific glassware. Research on optical glass is dealt with by the British Scientific Instrument Research Association. During the five years of its existence, the expenditure of the Glass Research Association was guaranteed by Government grant up to a limit of £20,000 a year on condition that at least £5,000 a year was contributed by the industry.

On the other hand, the Iron Manufacturers' Research Association and the British Colliery Owners' Research Association, working under the Government scheme, have not asked for any grant aid.

The Government scheme of industrial research has, moreover, stimulated some industries to set on foot co-operative schemes having similar objects, but with no official connexion with the Department. It is understood that the proposal for the formation of the Rubber Research Institute in Malaya, for the investigation of scientific problems affecting the rubber plantations there, was the direct outcome of the institution of the research association movement ; while the brewing industry in this country has also instituted a research scheme on a co-operative basis financed by a large number of firms under the auspices of the Institute of Brewing.

Grants were offered to research associations in the first instance for a period of five years, and this period has in most cases now elapsed. Originally, it was contemplated that a period of five years would suffice to convince industry of the value of co-operative research, and that at the end of that period the associations would not be in need of any further financial assistance from the State. But conditions during the post-war years prevented the scheme from receiving a fair trial, and grants for further periods are being made on a diminishing block-grant basis to research associations who succeed in showing that the industries with which they are respectively identified are not able at once to provide the whole of the necessary funds to enable research to be effectively carried out, that the association is being conducted on sound lines, and that it is likely eventually to become firmly established in the confidence of the industry. Before any decision is reached to extend the period of State aid, expert enquiries are conducted into the scientific, economic, and administrative aspects of the work of research associations from

whom applications for a renewal of grant are received.* These enquiries have afforded valuable information as to the present position of the industries affected and of their attitude towards scientific research.

Subscription Income of Research Associations.—The research associations have adopted several different methods of assessing the subscriptions of their members. The basis of subscriptions has been, variously, amount of wages paid, capital, number of employees, and capacity of plant or number of mechanical units (e.g. cotton spindles) utilised in the members' business; in several cases the subscription of a member has been upon a voluntary basis. Of these, experience has shown that the wages basis is unreliable, if only because of the fluctuating income which it yields: when members' subscriptions are calculated upon the sums they have paid in wages in the previous year, the result is that in times of industrial depression the income of the research association falls off and does so when research is possibly most needed. The method of levying subscription upon a voluntary basis appears to be equally unsatisfactory. There is a tendency for such subscriptions to be regarded by the members of the association as contributions to a benevolent organisation and for the attitude of the individual member towards the association to be governed by this feeling. Generally speaking, the capital basis of subscription has proved the most satisfactory, especially where it is sufficiently elastic to make equitable provision for members of whose business only a portion is concerned with the particular industry represented by the research association.

Progress.—Although some industries have responded with alacrity to the offer of State assistance made under the scheme, others have been less prompt, whilst others again have not attempted to avail themselves of its benefits.

* The following industries have already been studied in this way:—

Photographic.	Rubber and tyre.
Woollen and worsted.	Leather.
Portland cement.	Motor.
Boot and shoe.	Shale oil.
Cotton.	Refractories.
Scientific instrument.	Launderers.
Glass.	Cutlery.
Linen.	Electrical.
Cocoa, chocolate, sugar confectionery and jam.	Motor cycle.
Non-ferrous metals.	Silk.
	Cast iron.

The following 26 research associations have been formed under the Government scheme :—

* The British Iron Manufacturers' Research Association.
The British Cast Iron Research Association.
The British Non-Ferrous Metals Research Association.
The British Refractories Research Association.
The Research Association of British Motor and Allied Manufacturers.
The British Motor Cycle and Cycle Car Research Association.
The Research Association of British Rubber and Tyre Manufacturers.
The British Cutlery Research Association.
The British Scientific Instrument Research Association.
The British Electrical and Allied Industries Research Association.
The British Cotton Industry Research Association.
The British Research Association for the Woollen and Worsted Industries.
The Linen Industry Research Association.
The British Silk Research Association.
The British Leather Manufacturers' Research Association.
The British Boot, Shoe and Allied Trades Research Association.
The Scottish Shale Oil Scientific and Industrial Research Association.
The British Photographic Research Association.
The Research Association of British Paint, Colour and Varnish Manufacturers.
The British Portland Cement Research Association.
The Glass Research Association.
The British Launderers' Research Association.
The Research Association of British Flour Millers.
The British Association of Research for Cocoa, Chocolate, Sugar Confectionery and Jam Trades.
The British Food Manufacturers' Research Association.
* The British Colliery Owners' Research Association.

Research in connexion with coal mining until recently has been mainly concerned with the need for greater safety in mines, and this work is carried on by the Safety in Mines Research Board of the Mines Department under statutory authority. Research on the utilisation of coal is primarily the concern of the consumer, and is thus a national question. It is therefore undertaken at His Majesty's

* Not in receipt of grant from the State.

Fuel Research Station, Greenwich. Research into the economic winning of coal is the affair of the colliery owner, and a British Colliery Owners' Research Association has now been formed.

It will be noticed that in the above list a few important industries do not occur, for example, shipbuilding, railways, steel manufacture, and the heavy and organic chemical industries. The individual needs of the shipbuilding industry are to a small extent met by the work carried out in the Froude National Tank at Teddington, which is financed in equal shares by the Government and by firms in the shipbuilding and shipping industries. Several of the railway companies and many big engineering firms and chemical manufacturers maintain research laboratories of their own, some of them large and efficient; but, even so, there are many problems of fundamental importance affecting these industries as a whole that can only be effectively attacked by co-operative effort. Particularly is this so in connexion with research leading up to the standardisation of materials, and with problems requiring expenditure unprofitable to the individual firm, either because it cannot retain sufficient of the benefit derived to reimburse itself, or because the research is more costly than the single firm can afford to undertake on an adequate scale.

The majority of the research associations have made and are making substantial progress, though the degree of success varies from trade to trade. In the following paragraphs an indication is given as fully and accurately as available information allows of the extent to which research associations have succeeded in gaining the support of their industries.

Scientific Instruments.—Practically all the optical glass manufacturers, the majority of the leading optical instrument manufacturers, some of the leading manufacturers of electrical instruments of a scientific, as distinguished from an industrial, type, and practically all the leading manufacturers of X-ray tubes, excluding those manufacturing under the licence of a foreign firm, are represented in the British Scientific Instrument Research Association.

Photographic Industry.—The firms engaged in the photographic industry may be divided into two groups: those which make sensitised materials (plates, films, and paper) and those which produce other photographic materials. In the first group 90 per cent. of the capital of exclusively British firms is represented in the Research Association, and in the second group 50 per cent.

Woollens and Worsteds.—Of the total number of firms engaged in the industry, approximately one-third are members of the Research Association, but these firms represent considerably more than one-third of the capital employed in the industry; on a capital basis the Association is supported by approximately two-thirds of the industry.

Motor Cars.—Of the motor-car industry, it is estimated that one-third to one-half supports the Research Association, whether the estimate be based on wage bills or on capital.

Boots and Shoes.—Of the thousand or so firms engaged in the boot trade in this country, only 180 are members of the British Boot, Shoe, and Allied Trades Research Association, which thus represents less than 20 per cent. of the industry as measured by the total number of firms in it.

Cotton.—It is estimated that more than 85 per cent. of the capital employed in the cotton industry in all its branches (spinning, weaving, bleaching, dyeing and finishing) is represented in the Cotton Industry Research Association. The firms who have joined the Association constitute 60 per cent. of the total in the industry.

Linen Industry.—In the linen industry it is estimated that one-quarter to one-third supports the Research Association on a capital basis.

Rubber.—The Research Association estimates that, excluding cable manufacturers (who incidentally are large users of rubber), the present membership represents approximately 70 per cent. of the total British capital engaged in the industry, and probably at least 50 per cent. of the total consumption of raw rubber.

Cocoa, Chocolate and Jam.—Forty-nine of the 104 ordinary members of the Manufacturing Confectioners' Alliance, and 57 of the 204 members of the jam section of the Food Manufacturers' Federation are members of the Research Association.

Refractories.—Sixty-two firms, or about 40 per cent. of the total number of firms engaged in the manufacture of refractory materials such as fire-bricks and silica bricks, are members of the British Refractories Research Association. In addition, 13 iron and steel manufacturers (some of whom have refractory departments), three engineering firms, five firms of coke-oven builders and gas engineers, seven coal and quarry owners, six sundry metal manufacturers, two electricity undertakings, one gas undertaking, and two institutions (the Institution of Gas Engineers and the Iron and Steel Institute) are subscribers to the Association.

Laundries.—On a rough estimate based on the total number of employees in the industry and the total number employed by members of the Research Association, the Laundry Research Association represents about 38 per cent. of the whole industry.

Leather.—About 60 per cent. of the industry are members, reckoned on the basis of the total amount of wages paid per annum.

Electrical Industry.—The Electrical Research Association is substantially representative of the manufacturing side of its industry. It has been computed that the capital of firms engaged in production in the electrical and allied industries is about £86 millions. Of this figure, £73 millions—nearly 85 per cent.—represents the capital

of firms who are members of the Research Association. The electrical supply industry (power and light supply undertakings) is not so well represented ; the annual revenue of the supply industry is approximately 35 millions, but no more than one-third of this is represented in the Association.

Silk.—50 per cent. of the employers' federation (the Silk Association) are members of the Research Association.

Cast Iron.—The iron founding industry in this country is widely scattered and includes a great number of very small jobbing foundries. Of the total number of foundries which would be able to derive substantial benefit from the work of the Cast Iron Research Association, possibly one-quarter are members of the Association.

In the appended table (see page 333), figures are given showing the amount subscribed by the members of each research association up to the last completed year (col. 4), the amount of Government grant for the same period (col. 5), and the date of formation (col. 2).

It must be confessed that the movement has not yet secured, in the majority of cases, either the degree or range of support that will enable it to become the powerful factor in the restoration of industrial prosperity which it might and ought to be. The industrialists of some other nations are in many directions still ahead of us in the systematic application of science in their business, and they show more scientific imagination in making plans for the future.

Review of the Work of the Research Associations.

Inadequacy of the five-year period.—As already pointed out, the inquiries have shown that the five-year period during which grants have been given has been insufficient to enable the majority of the associations to produce results of direct utility to the industry and to convince those concerned of the value of co-operative research. The first three years or so have been spent in preliminary organisation, in finding suitable directors and scientific staffs, in surveying the industries and mapping out programmes of research, in finding or designing and building laboratories and in equipping them. This is not surprising, since the experience of the Department itself is that three years generally elapse before one of its own research organisations is able to get into full stride.

The inadequacy of the five-year period is most clearly apparent in industries in which the scientific principles underlying the processes of manufacture are little understood. In old-established industries, such as the textile industries, the accumulated experience of manufacturers in association with the manipulative skill of the workpeople has enabled a high standard of efficiency to be reached despite the fact that little has been known hitherto of the physical qualities of the materials used or the precise nature of the properties required in the ultimate product. But the research associations

formed by these industries can make but little headway with the investigations of practical scientific problems until the range of their knowledge on the more fundamental issues is considerably extended. This being so, results of direct industrial importance are not likely to accrue in the first few years of the associations' existence, and members must be called upon to exercise patience and faith.

Nevertheless in several industries the need for concentrated research on fundamental problems is fully recognised by the firms who have joined the research association. The Cotton Industry research association is the biggest research association in the country, with an expenditure of more than £45,000 per annum. Yet nearly the whole of its research has been of a fundamental character, leading, up to the present, to comparatively little in the way of utilisable results. A similar policy is being followed by the Leather Research Association. The Directors of these two associations are confidently of opinion that the policy is a wise one and will in the end be the most fruitful of results, and this belief is fully shared not only by the scientific experts who carried out the inquiries into the work of these associations, but also by the members themselves.

It is possible that in times of prosperity five years' experience would have served to convince some industries of the desirability of co-operative research. But it has so happened that the trial of the Research Association scheme has fallen within a time which has proved abnormally difficult for most of the industries concerned.

Trade depression has been coupled in many instances with difficulties arising from high overhead charges due to plant extensions during the war, from the forced disposal of surplus war stock, from the shortage of raw materials, from the loss of overseas markets during the war, and from changes in the public taste. After the war, at least one industry had largely to remodel its technical processes, and the period of transition has proved to be one of anxiety and financial uncertainty. In such trying industrial circumstances several research associations have found it most difficult to secure enough members to furnish an adequate income, and they therefore feel that five years has not enabled them to test the co-operative research scheme thoroughly.

All the research associations whose work has so far been reviewed (see footnote on page 312) have applied for a renewal of the Government grant. Of the twenty-one associations whose applications have been dealt with, three associations have been refused further grant. These are the British Portland Cement Research Association, the Glass Research Association and the Shale Oil Research Association. The operations of the first-named during the five-year period have been highly convincing as a demonstration to the industry of the value of research. The industry is well able to provide for the necessary research without financial assistance from the State. In

the second case the operations of the association were not being conducted satisfactorily from the scientific point of view, and adequate funds from the industry were not forthcoming. In the case of the Shale Oil Research Association, the six member firms of which the industry consists were unwilling to embark upon the wider and more costly scheme of work which the expert advisers of the Department deemed necessary. Further assistance will be given by the Department to the remaining industries after the first five years; but in the generality of cases by diminishing annual block grants in order that there may be a reasonable incentive for them to place their associations on a self-supporting basis.

Need of increased expenditure.—Like most other research organisations, research associations could with advantage spend larger sums on their activities if funds were available. In their early years, however, when membership is restricted to the relatively few firms who have faith in the value and methods of science as applied to industry, the available funds are inevitably restricted and they can hardly be expected to expand substantially until results of convincing utility to the industries have been obtained. The larger industries are of course in an advantageous position as compared with the smaller, since a comparatively small unit of assessment may yield sums adequate for research on a comprehensive scale.

Broadly speaking, it must be recognised that co-operative research is not likely to lead to striking results unless those connected with the industry are prepared to raise considerable sums of money. Researches which show big results take a long time, need first-rate men to direct them and are expensive both in staff and equipment. The buried cable research, to which reference is made later, took over five years. The same is true of the turbine prime-mover, the Coolidge tube, the tungsten filament lamp and permalloy, three of which are of entirely foreign origin. While a research association with an income of, say, £5,000 to £6,000 per annum can doubtless do useful work, that work is bound to be insignificant in comparison with the possibilities offered by investigations planned on the scale adopted nowadays in the United States and Germany.

It has been stated* that the amount spent annually in the United States on industrial research for which authentic data are available is approximately 75 million dollars; while another authority† places the amount expended annually by American manufacturers in the conduct of laboratory research alone at 35 million dollars. Mr. Holland* states that the research activities of

* Industrial Research in the United States, by Maurice Holland, Director of the Division of Engineering and Industrial Research, National Research Council, U.S.A. Published by the Masaryk Academy-Institute for Industrial Management, Prague, 1924.

† Co-operative Industrial Research, Published by Department of Manufacture, Chamber of Commerce of the United States, Washington, 1925.

30 odd trade associations (as distinct from private firms or corporations) account for between 10 and 12 million dollars a year; for example, the National Canners Association spend annually $150,000, the National Lime Association and the Portland Cement Association each about $100,000, and other associations very considerable sums. As to research laboratories maintained by private firms and corporations, in 1924 the General Electric Company spent three million dollars on research, the Du Pont de Nemours Company, makers of chemicals and explosives, two million dollars and the General Motors Research Corporation over a million dollars; and the staff employed on research in the laboratories of these firms ranged from 250 to over 500.* Other examples, of which details have been supplied by the firms themselves, are of interest. By far the largest of the research laboratories maintained by a private firm is that of the Bell Telephone Laboratories, Incorporated, which, together with the Department of Development and Research of its associate, the American Telephone and Telegraph Company, employs a staff of more than 4,000 persons, of whom some 1,800 are trained engineers, chemists, physicists, or other scientific workers, engaged exclusively on research and the development and improvement of apparatus, materials, and methods of communication; the annual expenditure of these associated laboratories is approximately fourteen million dollars. Other notable instances are the Goodrich Company (manufacturing tyres and rubber goods) which spends an average of one and a half million dollars per annum upon industrial research and employs an average of 300 persons on the work, the Eastman Kodak Company, which is spending at present about 600,000 dollars a year on factory research (of which one-third is devoted to semi-developed processes) and an additional 400,000 dollars on large-scale research and experiment—a total of a million dollars, the Bakelite Corporation, which spends annually 300,000 dollars on research and a like amount on development of processes, the New Jersey Zinc Company and the National Lead Company; all these concerns employ some scores of scientifically trained staff upon research work. Other firms which are known to conduct research upon a considerable scale are the International Nickel Company, the U.S. Industrial Alcohol Company, and the American Brass Company. It may be mentioned that a list of industrial research laboratories published in 1920 includes no less than 526 laboratories maintained by industrial associations or companies.* Finally, there is the Mellon Institute of Industrial Research of the University of Pittsburg, where industrial research for individual firms and trade associations is carried out on a contract basis;

* Bulletin of the National Research Council. Research Laboratories in Industrial Establishments of the United States, vol. 3, Part I, Number 16. Published by the National Research Council of the National Academy of Sciences, Washington.

during the year ended February, 1926, 54 industrial fellowships were in operation, employing 94 research chemists and engineers, and $527,000 was received for the work

In Germany research is conducted on an extensive scale by the leading industrial organisations. Thus, the group of firms manufacturing chemical and allied products, formerly known as the Interessengemeinschaft, employs two thousand research chemists and expends annually many thousands of pounds purely on research work. The large iron and steel corporations also spend large sums for research purposes; for example, it was recently stated at the council meeting of the Aktien Gesellschaft für Industrie und Technik that 12 million marks (£600,000) had been devoted to the experimental work in Germany on the distillation of coal with which the I.G. Farbenindustrie is now associated, and that, of this sum, 10 million marks had been spent on the Bergius process. It is more difficult to obtain information as to the details of expenditure on private research work in Germany than it is of similar organisations in the United States. The astonishing progress made in Germany in industries where technical knowledge and scientific methods are essential is clear evidence, however, that a great deal of research is going on in the laboratories maintained by the big industrial undertakings. Besides these private laboratories there is the Kaiser Wilhelm Gesellschaft founded for the promotion of scientific work on the occasion of the centenary of Berlin University with an annual income of £14,000, one-third of which is provided by the State. In association with the Gesellschaft, research work is carried on almost entirely at the cost of industry at central institutions in different parts of Germany on industrial physiology, biology, chemistry, physics, physical and electro-chemistry, oil derivatives, and coal. The textile industries support an institute at Dresden for research work on all textile fabrics, with an annual income provisionally fixed in 1918 at Mk. 300,000. Institutions have also been set up in Germany by or with the support of interested industries for research on wood and wood pulp, colloids, leather, gas engineering, and on matters of interest to the fermentation, beet-sugar, flour milling, and starch trades.

There is no doubt that, in Great Britain, research is extensively carried on in certain industries by private firms and corporations. No attempt is here made, however, to describe the work of private research laboratories in this country, since there are no means by which accurate and complete information can be obtained.

Results.—Almost all the inquiries that have been made show that the work of research associations has had a definite educational value. Under their influence private laboratories are known to have been set up in the works of numerous members who previously exercised no scientific control over their output, and members of the Councils of research associations have spoken of the increased interest they have taken in the technical side of their businesses owing to the stimulus they have received from their association.

It may be asked what benefits have actually been derived by industries and the general public from the work of research associations. A few examples of tangible benefits with a definite money value are given below. But for the most part the results of the work of research associations are reflected in a general all round improvement in technique, due to the adoption of scientific methods of control over technical operations and the more extensive use of scientific apparatus and instruments. A good instance of a research that has resulted in measureable financial gain is the work on the heating of buried cables carried out for the British Electrical and Allied Industries Research Association at the National Physical Laboratory. With the aid of the data that have now been obtained engineers are enabled to utilise existing cables to greater advantage, and to effect large economies in future extensions. The Director of the Cable Makers' Association estimates that as the result of the work of the Research Association the supply industry will at once be able to effect a saving of from £250,000 to £300,000 by the more advantageous use of existing cables, and to purchase new cables with a full knowledge of their true current-carrying capacity. Other investigations carried out by the Research Association on overhead lines, switchgear, insulators, turbines, condensers, etc., have produced results leading to considerable economies and improvements in practice. Altogether it has been estimated that the annual value to the supply industry of the work of the Electrical Research Association would be over £1,000,000 if the whole of the industry secured the full benefit of the work; it is known that at least one-third of this value has already accrued.

The work of the Scientific Instrument Research Association has led to the adoption by the makers of optical instruments (especially of photographic lenses) of the interferometer for measuring the aberrations of lenses. An immediate result was the placing of orders for the instrument to the extent of £3,000. A further result will, it is anticipated, be an all round improvement in the efficiency of the optical industry of this country. The Association has also given attention to materials such as abrasives and polishing powders used in the polishing of glass surfaces. One firm estimates that the use of the "S.I.R.A." abrasive has effected a saving of between £500 and £750 per annum; a second firm estimates that it has resulted in a saving in labour of 10 per cent. in the glass grinding department. Other firms have similarly expressed their appreciation of the value of the abrasive and of the economies effected by its use.

The joint research upon die castings in which research associations and Government Departments are co-operating, although by no means completed, has already yielded results of industrial value. One manufacturer of aluminium alloy castings is stated to have utilised some of the results with a consequent saving of £100 a month

In the cast iron trade the Research Association has been able to advise its members as regards cupola practice with considerable practical results. In one instance the changes suggested led to the melting of ten tons of metal per ton of coke consumed in place of eight tons; for a foundry with an output of 100 tons a week the corresponding saving would be approximately £250 per annum.

In the textile industries a modification of the wool scouring process suggested by the Woollen and Worsted Research Association led to an actual saving to one firm of at least £2,000 per annum and of at least £1,000 per annum to another. A pure strain of flax giving a notable increase of yield of fibre (25 per cent.) has been produced by the Linen Research Association and several tons of seed were subsequently handed over to another organisation by whom it is being further "bulked" and placed on sale.*

The Portland Cement Research Association devoted a great deal of attention to the operation of rotary kilns with a view to reducing working costs; one firm stated that largely due to "more scientific management" in which the Research Association had been of very great assistance, it was saving fuel to the value of over £25,000 per annum, while a second firm found that the adoption of improvements suggested by the results of research had led to a saving of from 300 to 400 tons of coal a year.

It would be possible to quote examples of the benefits conferred by the research associations on British industry in much greater number and detail.

General Conclusions.—To sum up, it may be said that the opinions expressed by the scientific experts who have inspected the individual associations, and a survey of the scheme as a whole, lead to certain general conclusions. The scheme has enabled a number of industries to realise the potential value of scientific research and to secure results which are finding their way into industrial practice. Although the results are as yet neither great in volume nor revolutionary in character, they are of importance and are realised to be so. Now that most of the associations have passed through the preliminary stages of organisation and have acquired experience and knowledge of the basic scientific facts underlying their respective industrial operations, more numerous results of direct and practical importance may be expected to accrue.

The scheme is suitable for adoption in this country in industries which include manufacturing units of such small size as to be quite unable to maintain scientific staffs of their own. It has further had a most stimulating effect in fostering an interest in the scientific aspects of technical operations and it has led to the wider adoption of scientific methods of control. Those intimate with the work of the associations and responsible for their management have freely testified to their utility in this direction and to their influence on the future well-being of the industries concerned.

* See page 387.

The scheme has made it possible to undertake important scientific work of a fundamental character, which no single firm could be expected to finance ; it has further facilitated investigations preparatory to standardisation, and work upon other questions of general importance to an industry such, for example, as moisture standards in textile goods.

Owing largely to the unfortunate economic circumstances experienced during the greater part of the post-war period no research association, save that founded by the cotton industry, has yet succeeded in acquiring sufficient financial support to embark upon an adequate scale of operations or to furnish undeniable proof of shortly becoming self supporting. The future of research associations must, however, rest with the industries concerned since the State cannot be expected to support indefinitely organisations instituted primarily for the benefit of the industries themselves.

Work conducted by the Department at Research Stations and elsewhere.

There are certain fields of research which cannot be identified with particular industries and can only be adequately taken in hand by the State itself. Researches on the proper utilisation of the national resources belong to this category, e.g., researches on food, fuel, building, timber, and possibly transport. These are matters in which the interests of the consumer are of first importance. A series of research boards or committees have been set up to supervise research, at the public cost, into scientific and industrial problems bearing on the four groups of materials just mentioned. The method of approach in these researches usually involves the preliminary investigation of the underlying scientific factors ; sometimes, as in the case of fuel, an endeavour is made to deal with problems in terms of large scale production. But the region of commercial development beyond the experimental stage lies outside the Department's scope.

The examples given below, dealing in some detail with the work of the various boards and committees, will show that the investigations undertaken directly by the Department are of interest, and often of considerable importance, to the industries with which they are concerned.

National Physical Laboratory.—The National Physical Laboratory was founded in 1901, and was transferred to the administration of the Department of Scientific and Industrial Research in 1918. Its work is so widely known that no detailed reference is called for, but the importance of its activities for industry is indicated by the fact that the Government is at present spending well over £100,000 a year on the maintenance of standards of measurement and on research of general benefit to industry.* All the results of this work are made

*See, for example, pages 267 and 276–7.

available to those interested. The Government is also spending from £25,000 to £30,000 a year on research into fundamental questions affecting the aeronautical industry. Besides this general work, tests and special investigations are undertaken at the Laboratory for individual firms or organisations on payment of fees, and special investigations may be carried out for firms at less than the cost involved if the general knowledge thus obtained is available for use by the Department for the benefit of industry generally or for the Government. The conditions under which work of this kind is undertaken can be obtained on application to the Director of the Laboratory, Bushy House, Teddington. It is doubtful whether these facilities are as yet fully appreciated by the industries of this country. In certain cases researches covering a wide field have been undertaken at the Laboratory for industry on the basis of a contribution from the firms concerned of not less than half the total cost. The work of the Froude National Tank for the shipping and shipbuilding industries and a comprehensive research upon the alloys of iron are examples of larger investigations of the kind referred to.

Fuel Research.—The Fuel Research Division, advised by the Fuel Research Board, carries out investigations into the utilisation of fuel. It is not directly concerned with problems of coal mining, which are dealt with by the British Colliery Owners' Research Association and the Safety in Mines Research Board (under the Mines Department), but, as many problems arise which are of common interest, close touch is kept with these organisations.

By far the most important fuel in this country is coal ; liquid fuels, though of great importance, do not occur naturally. Excluding shale oil, the output of which is small in comparison with the total consumption of mineral oils, liquid fuels must for the great part be derived from coal. Coal varies widely in its properties, and singularly little is known as to its true constitution and its variations from seam to seam. Accordingly, one of the main lines of inquiry has been the Physical and Chemical Survey of the National Coal Resources. A collection of available data showed that much of the existing information was unreliable, and it was decided to form local committees in the various coalfields to examine the different seams. Five committees have been appointed, composed of representatives of the mine owners, mining engineers, the Geological Survey, the Fuel Research Division, and an outside scientist, the necessary staff being provided by the Department ; but actual work in the coalfields has been delayed owing to the difficulties of the industry in the years following the war.

A necessary preliminary to the work of the survey was the preparation of standard methods of sampling and analysing coal, so as to ensure that analyses by different individuals may be comparable. Standard methods have also been laid down for the sampling of a seam *in situ* and for sampling consignments for special tests such as

boiler trials; considerable progress has been made with methods of sampling large commercial consignments—a very difficult, but important problem.

A second main line of inquiry concerns methods of carbonising coal, and the Gas Regulation Act of 1920, which was aimed at removing certain out-of-date restrictions on the methods of gas production, was based in this respect on the recommendations of the Fuel Research Board. Investigations have been carried out at the Fuel Research Station at Greenwich on the effect of various methods of working vertical gas retorts—a full size setting of four retorts dealing with 10 tons of coal a day having been erected for the purpose. A number of different gas coals have been investigated as to their behaviour in these retorts. A setting of horizontal retorts has also recently been erected for a similar purpose.

The investigations into the possibilities of "low" temperature methods of carbonising coals have been carried on since the erection of the Fuel Research Station in 1919, with the object of obtaining data and the development of a system by which a smokeless solid fuel for domestic purposes, and a supply of liquid fuel, can be obtained simultaneously from coal. Considerable progress has been made, but the problem has not yet been entirely solved. Close touch is kept with outside work on the same subject. Other possible means of obtaining liquid fuels from coal are being actively investigated.

Other questions dealt with include the production of power alcohol; the use of peat; the purification of coal; domestic heating; the combustibility of coke, and the factors on which it depends; the characteristics of oils and motor spirits obtained from coal; the behaviour of mixtures of petrol and other liquid fuels in motor engines; as well as laboratory investigations both at the Fuel Research Station and in university and other laboratories on various cognate problems.

It is not the practice of the Fuel Research Division to undertake tests of inventions, or of fuels or appliances for the use of fuels, except where they have a direct bearing on the work in hand. They may, however, undertake such work where facilities do not exist elsewhere. The Department has announced that it is prepared to undertake, on certain conditions, tests of plant for the low temperature carbonisation of coal in cases where the Director of Fuel Research is satisfied that a plant is working of a size comparable with a commercial plant.

Reports on special aspects and general résumés of the work are published from time to time.

Food Investigation.—The investigations on food being carried out under the Department deal with the engineering problems of cold storage, the freezing of meat and fish, the preservation of eggs, and the use of cold and carbon dioxide in the preservation of fruit. The

work is mainly carried out at the Low Temperature Research Station, established in connexion with Cambridge University in 1922, and at the Imperial College of Science and Technology, London. The experimental work on physical problems connected with the production of cold and the structure of cold stores is conducted at the National Physical Laboratory. Storage trials of fruit on a semi-commercial scale are made at Long Ashton.

At its foundation the Food Investigation Board attempted to envisage the fundamental scientific issues involved in the storage and handling of fruit, and to centre its work upon them. Such, for example, are the special features of freezing imposed by the colloidal state, or the influence of temperature, humidity and atmosphere, and of soil, climate, &c., upon the ripening of fruit. Work on such problems as these not only supplied much knowledge available for application to industry, but also educated the staff of the station to be able to deal with industrial difficulties. Due to this method of proceeding from basal science to particular applications the staff have always been ready to deal with special problems when these have arisen. For example, in the winter of 1918 a peculiar storage disease of the apple was encountered to which the name of " Brown Heart " was given, and the cause of the disease was discovered. In 1922 the Australian trade in apples suffered losses so enormous as to threaten the industry with disaster. The scientific staff of the Board were able at once to trace the injury to the fruit to this particular disease which they had worked out four years earlier. Analyses of the gases in the ships' holds carrying the apples confirmed their view that the disease was due to an accumulation of carbon-dioxide gas. It was arranged that four investigators should make the voyage to and from Australia to study the conditions of transport in the holds of the various types of refrigerated ships used. They were able not only to confirm the diagnosis but also clearly to define the remedy, and their recommendations have been acted upon with good results.

At the request of the Commonwealth Government a second expedition was sent to Australia to continue the study of the subject, and in particular to investigate the question of temperature control in the ships' refrigerated holds and the development of another apple disease called " bitter pit," whose ravages are justly dreaded by the industry.

This is an example of the work of the Board, outstanding because of the magnitude of the interests involved—the losses from " Brown Heart " in one year were stated to have been over a quarter of a million sterling—but many small individual firms have received similar help in diverse departments of food storage.

Building Research.—The work on building research is carried out mainly at the Building Research Station, Watford. It comprises two main divisions, (i) General Research (the Science of Building),

and (ii) Intelligence and Special Investigations. The programme of General Research is carried out under the supervision of the Building Research Board and includes the investigation of :—

(1) Efficiency of buildings from the standpoint of the user : architectural acoustics ; solar radiation of thin roofing materials ; absorption of moisture by internal wall coverings ; fire resistant construction.

(2) Weathering : development of accelerated weathering tests ; movements in materials due to temperature and moisture changes ; preservation of stonework.

(3) Materials : physico-chemical phenomena ; constitution, microstructure and correlation with physical properties of cements ; limes and plasters ; pozzolanic materials ; paints ; bricks and terra cotta.

(4) Structure and strength of materials : vibrations in buildings ; fatigue in building materials (other than metal) ; effects of wind pressure on structures ; physical changes ; standardisation of test methods, etc. ;

together with general laboratory work and collection of data on the properties of materials and their methods of manufacture.

The other division of the work includes the investigation of special problems undertaken for Government Departments (notably the Ministry of Health and His Majesty's Office of Works). In particular, inquiry is being made into such matters as the merits of suggested new building materials and alternative methods of construction. Tests and special investigations are also undertaken for firms and other bodies or persons on conditions similar to those already described above in connexion with the work of the National Physical Laboratory. In addition, examination is made of failures in building. The Intelligence Section includes the information bureau, and the attention of the building industry is specially directed to this bureau, the facilities of which are held freely available.

Forest Products Research.—A building for the accommodation of the Forest Products Research Laboratory is in course of erection at Princes Risborough.* The primary duties of the Laboratory are to determine ways and means of securing the more efficient utilisation of timber and to develop Empire resources. The average annual import into this country of timber alone, not to mention a vast quantity of derived products, is valued at some £50,000,000. Even small savings here and there, brought about by prevention of decay and by better utilisation, would mean, in the aggregate, a large national economy.

* Pending the completion of the building at Princes Risborough, the laboratory is functioning in a restricted way in temporary quarters at Farnborough, Hants. The transfer to Princes Risborough is expected to begin during the summer of 1927, and to be completed during the course of the ensuing twelve months.

The research on forest products is carried out in close collaboration with the Forestry Commission, the Forestry Institute at Oxford, and (in relation to timber mechanics) the Timbers Committee of the Imperial Institute, while the programme is supervised by the Forest Products Research Board, on which the Forestry Commission and other Government Departments are represented. The work is organised under eight sections, as follows :—

(1) Wood Technology (structure and identification)
(2) Timber Mechanics (strength properties).
(3) Timber Physics (seasoning).
(4) Wood Preservation (antiseptic treatment).
(5) Pathology (fungi and insects).
(6) Utilisation (liaison with industry).
(7) Wood-working (machining qualities).
(8) Minor Forest Products (cellulose and by-products).

Geological Survey.—The administrative control of the Geological Survey of Great Britain and the Museum of Practical Geology was transferred from the Board of Education to the Department of Scientific and Industrial Research on 1st November, 1919, and a Geological Survey Board was appointed to supervise the programme of the Survey. The Board includes geologists of standing and representatives of mining interests and of certain Government Departments.

The work of the Geological Survey in many ways leads to results of benefit to the nation and frequently enables wasteful expenditure to be avoided.

The Geological Survey maps and memoirs are accessible to all geologists and engineers, and are generally consulted before expenditure is incurred on mining and engineering schemes. The Survey does not itself undertake economic work, but it is always ready to give geological information to engineers, mineral borers, mining prospectors, etc. The staff of the Survey are constantly advising mining engineers on the correct interpretation of their bores. Extravagant estimates of the value of the prospects obtained in bores and other exploration have been checked, while, on the other hand, in cases where it had been assumed that no further coal or valuable minerals were present, the Survey has sometimes pointed out the probability that deeper exploration would reveal further resources, and this has proved true.

Other investigations.—Researches on the prevention of *corrosion of aluminium and aluminium alloys* carried out under the auspices of the Department have resulted in the development of a highly successful anti-corrosion treatment, which has wide industrial application. An extension of the process involving negligible additional cost enables the surface of the metal to be coloured. Patent protection for the process has been obtained, and there is every probability that it will greatly assist the development of the use of aluminium.

Investigations carried out on *adhesives* have led to a method, which has been tried out successfully on a manufacturing scale, of obtaining the highest grade of gelatin from fish residues, thus providing a new British source of raw material for the manufacture of gelatin of high quality and opening up a new industry in this country.

Among other subjects on which research is being carried out directly by the Department are Illumination, Lubrication, Properties of Materials at High Temperatures, Motor Springs and Gas Cylinders.

Other methods adopted by the Department for Assisting Industry.

Assistance to industry is not limited to the facilities offered by the scheme for establishing research associations or to the investigations undertaken by the Department for the Government. Research may be carried out by the Department directly for the benefit of industries in the following ways :—

(*a*) Problems of general industrial importance are investigated by the Department in co-operation with industries that have not formed research associations, under conditions analogous to those of the research association scheme ;

(*b*) Special investigations and tests are carried out for outside bodies and firms at the National Physical Laboratory and other research establishments of the Department.

Research in industries without research associations.—If an industry which has been unable to form a research association raises a problem of general industrial importance, and desires it to be investigated, the Department is usually prepared, if it is satisfied that the problem is a suitable one for scientific investigation and that the conditions are not favourable to the immediate formation of a research association, to contribute on the £ for £ basis towards the cost of the investigation in question. Investigations so aided are controlled through a board or committee already in existence or specially appointed for the purpose. Investigations of this kind are the researches carried out at the National Physical Laboratory on iron and steel alloys and the investigations in the Froude National Tank on the design of ship hulls and ship propulsion. The research on bridge stresses, of which about half the cost is borne by the railway companies and bridge builders, is a further example.

Special investigations and tests.—Under stated conditions, special investigations and tests can be carried out at the cost of the applicant in the research institutions of the Department for the benefit of industrial firms or other bodies. A substantial amount of work of this kind is carried out at the National Physical Laboratory. The testing of instruments and materials is a recognised function of the Laboratory, whose reputation in testing work of this order is very high ; materials and instruments submitted for examination are required to reach a high standard of quality and performance before they are passed as satisfactory.

Special investigations are sometimes undertaken which are of more general interest than those carried out for particular firms. For example, the Department is investigating, on behalf of the Dental Board of the United Kingdom, the chemical and metallurgical problems affecting dentistry, such as the production of dental alloys and amalgams and materials for use in the preparation of dentures and adhesive lutes. The cost of the work is borne by the Dental Board.

Research at other Government Establishments.

Other Government Departments maintain or assist research establishments for the conduct of investigations required in connexion with the services for which they are responsible. The Ministry of Agriculture, for example, distributes from the funds of the Development Commission grants-in-aid to a number of institutions in which research on agricultural science or on fisheries is carried on. The Post Office maintains a small research establishment at Dollis Hill. The research establishments maintained by the Fighting Services undertake investigations which are frequently of considerable interest to the engineering and metallurgical industries.

Boards have been established under the Department of Scientific and Industrial Research to assist the co-ordination of Government research work, particularly of research work initiated by the Fighting Services. When these researches are of general industrial and scientific importance the Department bears their cost on its own Vote. Through the co-ordinating boards (e.g. the Physics, Chemistry, Engineering, and Radio Co-ordinating Research Boards) the facilities offered by research establishments under other Government Departments for the conduct of work of industrial interest are available, in addition to those possessed by the research laboratories coming directly under the Department. The research on die castings in progress at the Research Department, Woolwich, is an illustration of a research of industrial interest which is being conducted under the auspices of a co-ordinating board partly at a research establishment maintained by another Government Department. In this particular case, moreover, four research associations (the British Electrical and Allied Industries Research Association, the Non-Ferrous Metals Research Association, the British Scientific Instrument Research Association and the Research Association of British Motor and Allied Manufacturers) are associated with the work. The Admiralty Research establishment at Holton Heath has also been utilised in a similar way for researches being conducted by the Department into the cause of the deterioration of fabrics, and into the direct production of power alcohol by bacteriological action on cellulose materials.

Universities and Research.

It was immediately apparent when the Government scheme for the promotion of research was first introduced that a shortage of experienced research workers would offer a severe check to the movement in favour of scientific research unless speedy methods were taken to encourage a comparatively large number of young people to take up research work as a career. It was realised that without the assistance of the Universities it would be impossible to make good the shortage. Accordingly the Department has for years past made grants to promising young graduates recommended by University professors as worthy of a training in scientific research. The grants are made for a period of two years and the work done is not industrial but of the kind best suited to the previous training and the capacities of the student. The Department believes this to be the best training for those who intend later to enter industry on the scientific side. The total of the grants for this purpose has been of the order of £25,000 to £30,000 a year.

Besides this, the Department has also endeavoured to encourage the original work of professors and other teachers of science in the Universities and higher technical colleges by giving them means of employing suitable assistants in their laboratories, not for the ordinary work of the institution, but to enable the individuals assisted to improve the quality and increase the amount of their original work. Grants of this kind have amounted, of recent years, to something like £10,000 to £12,000 a year. It is only by building up active schools of research in the Universities that the country can hope to produce the output of trained research workers necessary for the industries and for the purposes of Government itself.

Many University professors and teachers have given valuable service to the Department as members of its research boards and committees, while others have agreed to undertake, in their own laboratories, investigations of fundamental importance falling within the Department's programme of work. The estimated expenditure on research work being undertaken in University research laboratories during the present financial year on behalf of the Research Department amounts to over £30,000. Many universities, however, carry out a considerable amount of research work financed from funds derived from other sources.

Co-operation with Imperial Bodies.

The Department is in close touch with the research organisations established in the overseas dominions, with the Empire Cotton Growing Corporation,* the Imperial Tropical College of Agriculture, the Imperial Institute, and the Colonial Research Committee of the Colonial Office, and is able to obtain through these bodies (and in other ways) information on the imperial aspects of any scientific problem that may arise. Investigations are also undertaken on

* See page 388.

behalf of overseas Governments by the Department's research staff to a limited extent. The following are recent examples of such investigations. An inquiry has been conducted for the Indian Government into the acoustic properties of the Legislative Assembly Hall at Delhi. Tests on the suitability of coal for purposes of low temperature carbonisation have been made on samples sent from Burma and from South Africa. As already stated two scientific expeditions to Australia have been arranged at the request of the Commonwealth Government of Australia in order to investigate the conditions in ships' holds in which cargoes of apples are carried. Arrangements have been made with the Commonwealth Government for the training of research workers at the Fuel Research Station, Greenwich, and at the Low Temperature Research Station, Cambridge, in the methods followed at those institutions. A student from South Africa was sent to the Low Temperature Research Station at Cambridge for training three years ago.

The Secretary of the Department of Scientific and Industrial Research last year (1925) visited Australia and New Zealand, at the invitation of the Commonwealth and New Zealand Governments, to advise on the organisation of scientific and industrial research in those Dominions and on their co-operation with research organisations in this country. The Commonwealth Government decided to modify the existing Institute of Science and Industry, and by recent enactment a Council for Scientific and Industrial Research has been appointed and financial provision made for its work; the Council has already initiated investigations with a view to developing the fuel and agricultural resources of the Commonwealth and to effecting improvements in the transport of Australian exports of meat and fruit. In New Zealand a Department of Scientific and Industrial Research, with a constitution and functions closely resembling those of the British Department, has been established by statute; and an Advisory Council set up to advise on its work and expenditure. The Department, it is expected, will be responsible for the maintenance of various existing scientific services and of a state laboratory for standards and tests.

The subject of research was considered by a Special Sub-committee of the Imperial Conference of 1926. The Report of the Sub-committee, which was adopted by the Conference, contained important proposals for the promotion of co-operation throughout the Empire. Briefly, the Sub-committee recommended that the respective Governments should nominate, as and when possible, representatives to take part in the quarterly meetings of the Standing Inter-departmental Conference in this country of representatives of the Development Commission (for Agriculture and Fisheries), the Medical Research Council and the Department of Scientific and Industrial Research; that the official representative of each organisation responsible for one of the broad fields of research, such as agriculture, medicine, industry, should have designated to him

"opposite numbers" in other parts of the Empire with whom he could communicate directly; and that special expert conferences that may be called from time to time, such as those already arranged for forestry and agriculture, should consider the desirability of establishing, as aids to co-operation, further bureaux, whether based, like the Imperial Bureaux of Entomology and Mycology, on particular sciences, or, like the proposed Imperial Forestry Bureau, on particular fields of application. (See Summary of Proceedings of the Imperial Conference, 1926, in Cmd. 2768, and its Appendices published separately in Cmd. 2769).

Note.—Detailed information as to the work of the Department can be obtained in the annual reports of the Committee of the Privy Council for Scientific and Industrial Research, and of the National Physical Laboratory, and in the reports issued from time to time by the Food Investigation Board, Fuel Research Board, and other boards and committees of the Department. In addition a large number of technical and other papers have been issued by the Department relating to particular investigations undertaken by its various organisations. A complete list of these can be obtained from His Majesty's Stationery Office.

APPENDIX.

Research Association.	Date of Formation.	Number of Financial Years completed to date (1.6.26)	Total Subscriptions raised during period in Column 3.	Total Grant given during period in Column 3.
(1)	(2)	(3)	(4)	(5)
			£	£
The British Photographic Research Association.	15.5.18	8	18,693	18,360
The British Scientific Instrument Research Association.	23.5.18	7	8,185	64,484
The British Research Association for the Woollen and Worsted Industries.	26.9.18	7	46,889‡‡	40,244
The British Portland Cement Research Association.	9.11.18	5*	24,788	22,090
The Research Association of British Motor and Allied Manufacturers.	13.3.19	6	25,804	24,510
The British Boot, Shoe and Allied Trades Research Association.	1.5.19	7	6,365	5,995
The British Sugar Research Association.	28.5.19	—†	—	—
The British Cotton Industry Research Association.	7.6.19	6	121,222††	62,662
The British Iron Manufacturers' Research Association.	3.7.19	5‡	16,335§	—‖
The Glass Research Association ..	8.8.19	5*	24,003	58,602
The Linen Industry Research Association.	10.9.19	6	50,430§§	44,907

For reference notes see next page.

Research Association. (1)	Date of Formation. (2)	Number of Financial Years completed to date (1.6.26) (3)	Total Subscriptions raised during period in Column 3. (4)	Total Grant given during period in Column 3. (5)
			£	£
The Research Association of British Rubber and Tyre Manufacturers.	30.9.19	6	28,976	27,383
The British Association of Research for Cocoa, Chocolate, Sugar Confectionery and Jam Trades.	4.12.19	6	19,794	17,709
The British Non-Ferrous Metals Research Association.	5.12.19	6	28,806	27,980
The British Refractories Research Association.	15.3.20	5	11,105	11,105
The Scottish Shale Oil Scientific and Industrial Research Association.	25.3.20	5	7,500	7,500
The British Launderers' Research Association.	19.7.20	5	16,211	16,180
The British Leather Manufacturers' Research Association.	27.7.20	5	12,151	12,051
The British Cutlery Research Association.	17.9.20	5	6,982	6,780
The British Electrical and Allied Industries Research Association.	22.9.20	5	50,221	49,676
The British Motor Cycle and Cycle Car Research Association.	16.10.20	5	8,050	8,050
The British Silk Research Association	17.11.20	5	7,530	7,500
The British Cast Iron Research Association.	24.5.21	4	10,027	9,252
The Research Association of British Flour Millers.	31.8.23	2	4,826	4,826
The British Colliery Owners Research Association.	29.12.24	1	—¶	—‖
The Research Association of British Food Manufacturers.	7.1.26‖‖	—	—	—
Research Association of British Paint, Colour and Varnish Manufacturers.	1.9.26	—	—	—

* These Associations went into voluntary liquidation at or shortly following the end of their first quinquennium.

† The British Sugar Research Association never became fully operative. During the four years 1922–1925 it carried out research on a limited scale assisted by a grant from the Department.

‡ This Association suspended operations at the end of its first quinquennium and so far as is known has not since resumed.

§ Estimate : exact information not available.

‖ These Associations have not applied for a Departmental grant.

¶ Information not available.

†† Exclusive of contributions from the Cotton Trade War Memorial Fund, amounting to £185,000 during the six year period in question.

‡‡ Exclusive of £3,762 received from the West Riding Research Fund.

§§ Including £13,000 from Government of Northern Ireland.

‖‖ The operations of this Association will for the present be confined to the preserved meat section of the industry.

CHAPTER V.

THE PRESENT POSITION OF BRITISH INDUSTRIES IN RESPECT OF INDUSTRIAL ART.

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THE PRESENT POSITION OF BRITISH INDUSTRIES IN RESPECT OF INDUSTRIAL ART.

[*Furnished by the British Institute of Industrial Art.*]

Introductory.

In July, 1924, the Council of the British Institute of Industrial Art were requested by the Committee on Industry and Trade to furnish them with information as to the present position and needs of British manufacturers in respect of industrial art. In the following report it has been assumed that the scope of this reference to the Institute was intended to be governed by the main purpose of the Committee's own reference, viz., the consideration of the factors which affect the power of recovery and development of British industry and trade, with special regard to the export trade. The report is, therefore, primarily concerned with art in relation to manufacturing industry as distinct from the production of individual works of art by artist-craftsmen. As will be seen, however, there is an important relation between the two which cannot be ignored. On the other hand, no attempt has been made to confine attention to the great groups of exporting trades, many branches of which are not dependent for their competitive power to any material extent on artistic quality and design, while they do not include some of the principal industries in which art plays a decisive part.

It is to be remembered that many of the last-mentioned industries, though not great exporting trades, are subject to keen foreign competition in the home market, both directly through the competition of products and in some cases also indirectly through the migration of artists or craftsmen. A study of the factor of industrial art as an element in their efficiency is, therefore, material to any comprehensive survey of trade conditions. Accordingly, the trades selected for treatment in this report are those the efficiency of which appears to be most dependent on the factor of industrial art, i.e., certain classes of textiles, furniture, pottery, glassware, metalwork and jewellery, books and printing.

The inquiries of the Institute have been directed to ascertain the present position and recent tendencies of each important branch of these trades in relation to industrial art, including the sources from which and the methods by which manufacturers obtain the designs they need, the training, functions and responsibilities of designers and their relations with the executive factory or workshop staff, the degree to which British manufacturers are dependent on foreign sources for design, the mode in which designs obtained from outside

are adapted to the technical conditions of factory production on the one hand, and to the special tastes, needs and conditions of home and overseas purchasers on the other ; and the other technical and economic problems which arise from the modern separation between the designer and the other factors in economic production and distribution. It should be clearly understood that the inquiries do not profess to be complete and exhaustive, and that they do not include all important branches of industry. All that can be claimed is that the survey affords material for provisional conclusions and a starting point for further research.

No attempt has been made to extend the study so as to obtain comparative results for the chief foreign countries, as such an enlargement of the inquiry, besides its inherent difficulty, would have involved undue delay and expense. On this aspect of the problem reference may be made to the official report, which is now being prepared for publication, reviewing the present position and recent tendencies of the industrial and decorative arts of the principal countries of the world so far as disclosed by their exhibits at the International Exhibition of Decorative and Industrial Arts held in Paris in 1925.

The results of the surveys made of the various groups of industries are summarised in the Annex to this report. These surveys are primarily concerned with the presentation of facts, and not with criticism or recommendations. Some of their salient features are referred to briefly in the following pages.

The Industrial Demand for Design.

As regards the industrial demand for design, the first distinction to be remembered is between the case of the manufacturer who obtains designs from a specialised class of designers distinct from the ordinary workshop staff, and that of the artist-craftsman who combines the function of designer and producer in his own person. It is with the demand for design on the part of the manufacturer that the present surveys are mainly concerned. Nevertheless, in any appreciation of the present position of British industries in respect of art, it is essential to take full account of the work carried on by the artist-craftsman side by side with the great industries, even though under modern commercial conditions their mutual influence can as a rule be only indirect. For the artist-craftsman is at once the repository of what remains of our ancient craft traditions and the pioneer explorer of the possibilities of new forms, methods and materials. Although the type of design suited to the great industries differs essentially from that of the artist-craftsman, it is nevertheless true that if, owing to the pressure of competition, the artist-craftsman disappeared, the result would inevitably manifest itself in a progressive degeneration and impoverishment of industrial design. It appears that the importance of this factor is

more thoroughly appreciated in Germany, where the influence of such organisations as the "Werk-bund" deserves close study. To take a single example, the influence on our own printing trades of the fine pioneer work of the so-called "private presses" (e.g., "Kelmscott," "The Doves" press and many others) has to a large extent been exercised indirectly, *via* German and American printing firms, who have been quicker to realise their importance and to borrow and exploit their ideas. The work of the artist-craftsman in furniture, silver and other metalware, and jewellery is referred to incidentally in the following surveys, but generally speaking, they are concerned chiefly with manufacturing industries.

Volume of Demand for Designs.

The surveys do not admit of laying down any generally applicable rule as to the proportion which the designing staff bears to the total number of productive employees, or as to the total volume of the industrial demand for new designs or designers, since the proportion and volume vary very widely from industry to industry, and also from firm to firm within the limits of the same industry, according to the special character and standard of quality of the output, the markets for which it is intended, and the methods of organisation of production.

Broadly speaking, and other things being equal, the demand for new designs is highest in proportion to output in the case of products whose life is shortest (e.g., printed cottons for women's dress in European countries), since not only are these goods most frequently renewed by the purchaser, but their design is the most sensitive to continual variations of fashion. On the other hand, articles like furniture or metalwork, which are expected to last for many years, are less exposed to short period fashions, though, like all art products, their form and design are subject to the slower movements of "style." A purchaser of silver-ware which may last a lifetime will not be tempted by the latest vagaries of fashion which in a few months will be out of date. In industries of this character design is largely governed by the past. At the best it is a continuous and living tradition growing out of old established practice, and adapted gradually to changing needs. At the worst, design may sink into the mere imitation of so-called "period-work," perhaps degraded by deceptive methods of cheapening.

The life of a design in the furniture trade is said often to extend to a generation or more, while the ephemeral designs for cotton dress goods only last for a year. Intermediate between these extremes are furnishing fabrics, lace, and pottery.

The volume of demand for *pottery* designers depends essentially on the class of trade. The survey shows that in the case of the few firms which employ "craftsmen designers" (i.e., designers who actually decorate or model the ware), the demand is relatively

high, e.g., six designers to 400 employees. In a large firm making high class ware by mass production methods, a single wholetime designer can keep 1,000 employees busy. In the smaller firms a large proportion of the designer's time is devoted to work other than creating designs, e.g., technical adaptation or calculation of costs. Under existing conditions and as at present organised, the whole pottery industry can only absorb a very limited number of fully trained designers. It is, however, to be remembered that in pottery there are two other classes of artists—the modellers and the decorators—who, under the modern system of division of labour, are usually distinct from the "designers." As a matter of fact, the "designers" are largely recruited from promoted decorators, who are, of course, much the most numerous class of the three. The least numerous are the modellers, for the shape of ware is much more constant than the decorative pattern, and many patterns may be made to a single shape.

In the branches of *metal work* examined, similar wide variations were found. At one end of the scale, the craftsman jewellers and silversmiths employ no special class of designers, since the essence of their method of work is the union of designer and craftsman in one person. At the other end of the scale is the cheaper jewellery trade, where the designers are few in comparison with the numbers employed, and frequently do other work than designing. In one such firm the designing for 120 men is done by the manager out of working hours, while in the case of much cheap jewellery no designers are employed, but such stamped designs as are used are provided by the die sinkers to the trade. Between these extremes are such branches as architectural and ecclesiastical metal work, and the higher class "trade" silversmiths and jewellers, who employ a relatively high proportion of designers and draughtsmen. For example, 26 firms visited employed 98 designers and draughtsmen.

In the *printing* trades the demand for design may be divided into three main branches: (*a*) design of the type, (*b*) design of the page, including selection of appropriate type "display," spacing, borders and arrangement generally, (*c*) design and decoration of book covers, illustrations and lithographic reproduction generally. The demand under (*a*) is necessarily very limited in volume, as new forms of type are comparatively rarely designed, and the best modern types are mainly based on old forms (e.g., Caslon Old Face, or one or other of the types preserved in the Musée Plantin). Under (*b*) it is very general for one of the heads of the firm to devote much time to what is termed "style," and such schools as the London County Council Central School of Arts and Crafts are very helpful in this matter. The printing of advertisements is perhaps the branch in which typographical design is more urgently needed. In matters covered by (*c*) the trained artist is of course necessary, but in reproduction by lithographic or other process it is essential

to the best work that the connection between the artist and the staff engaged on reproduction should be greatly strengthened. The development of the "offset" process of indirect printing is likely to have an important effect on letter design and display lay-out, and to increase the demand for men trained for these purposes.*

It may be added that an extremely interesting Report by a Committee on Types and Modes of Display for Government printing has been published by the Stationery Office.† Though the inquiry was primarily directed to the question of Government printing, the Report deserves much wider publicity than it has yet received

It may be noted, as a general rule, that in proportion to the increase of scale of manufacture and the development of methods of "mass production," the volume of demand for new designs tends to shrink relatively to the total output, inasmuch as one design suffices for an increasing volume of production. Combined with this decreased demand for designs is frequently an increase in the cost of preparing each design for actual manufacturing process. In the survey of the cotton trade, an estimate is given of the minimum quantity of goods that have to be produced from the same design before it can be said to "pay." The quantity varies from 50,000 yards (for the cheapest Indian market) to 3,000 yards (curtains, etc., for the home trade). Hence the trade demand for design has tended at the same time to diminish in volume and to become increasingly exacting from a purely technical point of view.

Before examining more closely the character of the demand for design, we may sum up as follows the general results of this part of the enquiry :—

(*a*) The demand for new designs varies very widely from trade to trade and also from firm to firm within the same trade according to the character of the work.

(*b*) Apart from the case of the artist-craftsman who combines designer and producer in the same person, the trade demand for new design is generally greatest, in proportion to output, in the case of products whose life is shortest.

(*c*) The volume of the aggregate demand of modern industry for new designs is much less in proportion to output than in the days of smaller industries and crafts, while the technical conditions to be fulfilled by designers have become progressively more exacting.

Character and Quality of the Demand for Designs.

The demand of a trade for new designs includes two distinct elements : (*a*) demand for designers to be employed in connection with the particular workshop, and (*b*) demand for designs to be

* See page 379.

† "The Report of the Committee on Faces of Type and Mode of Display for Government Printing": published by H.M. Stationery Office, 1922, price 4*s.* 0*d.*

purchased in the open market. In the more stable industries, i.e., those whose products have a relatively long life and are little exposed to passing gusts of fashion, the predominant practice is to employ "workshop" designers. As regards *furniture*, it is stated that "the employment of full-time designers is more common than it used to be and the outside designer has dropped out accordingly." In the *pottery* trade, the high class design is almost entirely supplied by workshop designers, but the bulk of the cheaper decoration is done by the application to the ware of lithographic transfers, the design and printing of which has become an entirely separate trade carried on by a small number of firms in the pottery district in keen competition with imports from German and other sources. In the *glass* trade, design is almost entirely supplied by workshop designers employed full time. In the *machine lace* trade, designers and designer-draughtsmen are employed full time by the makers, though a certain number of designs are purchased from outside.

In the *cotton* trade, especially the "fashion" trade in women's dress fabrics, the predominant practice is to purchase designs from independent "studios." There are some of these studios in Manchester, but their chief centre is Paris, whose ateliers largely govern the designs for all classes of fabrics destined to be made into costumes for which Paris sets the fashion. Thousands of Paris designs are purchased yearly by Manchester calico printers, merchants and manufacturers. Statistics relating to fourteen calico printing firms show that 42 per cent. of their designs are produced by the firms' designing staffs, and 58 per cent. purchased from the outside. Of the designs so purchased nearly three-quarters come from Paris.*

For the export trade to the Far East, Manchester does not depend on France but on oriental sources for suggestions of "motifs." Under these conditions the so-called "designers" employed by the Manchester export merchant or manufacturer are largely occupied, not in creative work, but in technical adaptation of "motifs" obtained from outside.

There is reason to believe that, from the point of view of national interests, the tendency to rely on outside, and especially on foreign sources, for so large a proportion of the designs by which British-made goods are sold at home and abroad has gone beyond the limits of necessity and of safety, and it is very desirable to counteract this tendency, and to limit the practice to the minimum required. The complete separation of creative design from manufacturing practice cannot but have a detrimental effect on technical and artistic quality, while the impress of British tradition and taste

* As a larger proportion of firms dealing primarily with the home market were visited, these statistics must not be taken as accurate for the whole cotton industry. They probably exaggerate the extent of our dependence on foreign design.

tends to be lost. We are, therefore, glad that among the more far-sighted manufacturers there is a growing realisation of the importance of strengthening and developing the creative functions of their own designing staff. We believe that more confidence might safely be shown in British power of design, and more effort put forth to make it an actual attraction abroad. The problem, however, is a many-sided one which needs much further research for its solution.

The relation of the designer to the operative staff on the one hand, and to the management on the other, needs very careful adjustment. In this connection it must not be forgotten that creative artistic power is extremely sensitive to "sympathetic" or uncongenial surroundings and conditions. The artistic temperament does not fit in easily with the regular hours and restrictions of factory and business life, and under present circumstances (except where these conditions are relaxed) most designers, if given a choice, would probably prefer a position of independence. If, as we believe, the strengthening rather than the severance of the connection between workshop and studio should be the main objective, it is clear that the problem of the functions, status and relations of the workshop designer in modern industry is one of prime importance.

The Remuneration of Designers

A certain amount of information on this subject will be found in the surveys, but it is not sufficiently comprehensive to justify any wide generalisation. In *textile* design studios the apprentices begin at 8*s.* to 10*s.* per week, increase to £3 10*s.* a week at the age of 23, and thereafter may rise to £6 per week as designers. "Finishers" (who colour and trace, &c.) earn £3 per week or less. Adult designer-draughtsmen in the *machine lace* trade earn from £200 to £600 a year. In *pottery*, a whole time designer will average £400 to £500 per year, beginning at £300 and rising to £800 at the outside. Transfer designers are paid from £5 to £10 per week. In the *glass* industry a chief designer may receive from £350 to £400. Assistants rise from 57*s.* at the age of 21 to £4 a week. A *furniture* designer begins at from 10*s.* to 30*s.* a week and may rise progressively to as much as £1,000 a year or more as a head designer. Head designers in *silver work* earn from £5 to £8 a week in smaller firms and much more in larger firms. There are, of course, frequent complaints of the insufficiency of the designer's pay and the narrowness of his prospects, while manufacturers sometimes declare that they would willingly pay much more for a thoroughly good man if they could find him. Meanwhile, it is to be noticed that two of the surveys (in connection with furniture and pottery) mention that the best designers go to America to obtain higher pay, while British bookbinders are also being imported into the United States.

The Supply of Designers.

As stated above, a considerable part of the industrial demand for designs is at present supplied by the importation of ready-made designs from abroad, chiefly from Paris, but also to some extent from other sources. That section of the supply of designers which is furnished from British sources is mainly recruited by apprenticeship or by promotion from other grades of employees, the learners in many cases supplementing their industrial training by evening classes at an art school or technical school.

In the *pottery* trade, designers are very largely selected by promotion from the decorators who have shewn ability in evening art classes. In this industry, the connection of the trade with the local art schools is unusually strong, and the Director of the art schools in the "Five Towns" is the Art Adviser to the National Federation of Pottery Manufacturers. There is a system of scholarships which enables boys, while in the factory, to spend one or more days and several evenings per week at art schools. Several of these boys have won scholarships at the Royal College of Art and have thereafter returned to the Potteries. There is a strong connection between the Potteries and the Royal College of Art. It is not, however, the general practice in the pottery trade to employ designers solely trained in schools of art. Manufacturers generally demand previous trade experience. In the annexed survey only four cases are given of pottery designers who had no previous pottery experience, and, of these, two had already been textile designers.

In the *glass* industry designers are frequently promoted learners already in the works. Generally speaking, however, the existing chief designers have had an art school education.

In the *furniture* trades, such schools as the Central School of Arts and Crafts and the Shoreditch Furniture School are recognised by the trade as supplying a good foundation of training, but, generally speaking, the industry does not draw to any great extent on students of schools of art for its designers.

The *architectural metal work* trades complain of difficulty in obtaining suitable men, and rely largely on training their own draughtsmen. They use the evening classes of art schools to supplement this training, but offer very few openings for the full-time art student. The same is true of the *silversmiths'* trade, though it attaches value to the training given in such institutions as the Central School of Arts and Crafts and the Birmingham School for Jewellers and Silversmiths, which afford opportunities not only for drawing but for actual craft work. In the *jewellery* trade, designs are influenced by fashions emanating from France, and we find accordingly a tendency to purchase French designs. The survey gives an interesting comparison of the training of a French and an English designer. The French designer referred to had spent three

years at a school of art, followed (after a short period of practical experience with a firm) by three years at a school of technology. The English designer's training is less systematic. As a rule, he begins in a workshop and develops his knowledge of drawing at evening classes.

As regards the *textile* trades, it has already been pointed out that certain branches of the cotton trade are largely dependent on foreign designs; nevertheless, taking the cotton trade as a whole, the bulk of the demand for the designs is supplied from British sources. Thus the figures already mentioned with regard to the sources from which fourteen firms of calico printers obtain their designs shew that 42 per cent. of the designs were produced by the staff of the firms, 42 per cent. purchased in French ateliers and 16 per cent. purchased in Manchester, London, or elsewhere in Great Britain. Thus, the home-produced element amounts to 58 per cent. of the total, and it is stated that this proportion is increasing since the war. If we take into account the workshop designing staff required for the technical adaptation of the purchased designs, and also the fact that the above statistics, for reasons already given, exaggerate the degree of our dependence on foreign sources for design, it is probably true that even in the calico printing trade over two-thirds of the design requirements are home-supplied. The majority of the designers in the cotton trade are trained by apprenticeship in the design studios, whether connected with or independent of the particular business. Sometimes, but not always, apprentices are encouraged to attend art schools in the evening. The firms, however, appear sometimes to hesitate to engage an art student directly as a designer. The reasons for their reluctance, and the counter-criticisms of art masters on trade practice, are referred to in the survey. Whatever be the merits of the divergent views expressed, it is clear that an unfortunate gap remains to be bridged between the current demands of the trade as at present organised and the institutions which are specially concerned with art training.

When we pass from the cotton to the *silk* industry we find a very different situation. Here tradition is stronger, the relation between the trade and the schools of art more intimate. In the case of the first firm mentioned in the survey, which produces silk hangings and upholstery, both the head of the firm and all the designers have received an art school training. In the Macclesfield trade, which is largely concerned with dress materials, neckwear, &c., all designers have to go through technical training, the most usual practice being five to seven years' apprenticeship in the designing office with four evenings a week spent at the local art school and school of technology. There is close co-operation between both these schools and the manufacturers. The head of the art school is a professional textile designer, and some of the manufacturers are old students. The industry is, of course, very small compared with

cotton, but within its limits it presents a good example of reasonable and successful co-operation. The full-time design students who complete their course each year at the schools (about two a year) are at once absorbed by the silk industry. The practice of buying French designs is said to have decreased "chiefly owing to the improved local training." These satisfactory results are probably closely connected with the fact already indicated that a strong continuous tradition of industrial art has been preserved in this trade, in which the craft feeling still survives.

In the *machine lace* trade of Nottingham, the great bulk of designs, perhaps over four-fifths, are derived from British sources. Most makers employ not only a designer but also full-time designer-draughtsmen, who receive a seven years' training, from 14 to 21, in the designing office. The local school of art, though specially adapted to the lace trade, has only about 20 lace design students, but it is to be remembered that the position and prospects of the industry are not at the moment economically attractive. Comparatively few of the employers, managers, designers or designer-draughtsmen engaged in the trade have received an art school training.

As regards the *printing* trades, the London School of Printing is substantially supported by the trades, including the trade organisations and unions. Over half the students attend in the employer's time without deduction of wages, and perhaps half of these have their fees paid by employers. The school is not in the main a school of industrial art, but aims mainly at technical efficiency and the maintenance of a high standard of commercial printing. On the other hand, the printing classes at the Central School of Arts and Crafts, and the Day Technical School of Book Production at the same institution, are successfully facing the larger problem of research and design, and of setting new standards of typography. Certain high class London printing firms take the majority of their apprentices from this school or send lads to it for a preliminary training before apprenticeship.

The Position and Functions of Schools of Art.

It is evident from the above brief summary that the functions performed by the schools of art in relation to the supply of industrial artists differ very widely according to the circumstances of particular trades and localities, but the whole position clearly presents a problem, or rather a series of problems, which urgently call for further intensive research. In the meantime, some light may be thrown on the matter by the following statistics of attendance at schools of art in England and Wales which have been furnished by the Board of Education. We have not thought it necessary at present to extend the inquiry beyond England and Wales, but no doubt corresponding figures for Scotland could be readily obtained.

PARTICULARS OF ATTENDANCE AT SCHOOLS OF ART IN ENGLAND AND WALES.

(*The particulars relate to 174 schools in the year ended 31st July, 1925, and to 188 schools in the previous year.*)

Type of Student.	Number of Students.		Average hours of attendance in the year per Student.	
	1924.	1925.	1924.	1925.
Full-time students (senior)	4,302	4,368	666	680
Full-time students (junior)	1,220	1,357	946	937
Junior art dept. (part time)	272	230	113	109
Artists, architects, or art teachers attending for part-time study	1,504	1,471	87	97
Industrial students taking courses related to their work	14,275	14,903	92	89
Teachers, other than art teachers, taking specially planned courses	2,771	3,088	56	53
Other part-time students	17,895	19,028	89	89
Pupils of elementary and secondary schools and training colleges instructed in the school of art premises	3,625	3,218	71	71
	45,864	47,663	164	164

We learn from these figures that in 1925 there were 174 separate schools of art in England and Wales attended by over 47,000 students. Of these, about one-eighth were "full-time" students, whose attendances, however, accounted for more than half the total student hours worked. About one-third were part time industrial or professional students taking courses relating to their work, but the average duration of their attendance was only about 90 hours per annum, or not very much more than one attendance of two hours per week.

The remaining classes of students were mainly teachers in training, or amateurs desirous of learning the practice of some branch of art without any definite professional object. Although we have no means of analysing the full-time students, we cannot doubt from the information which we have received that the great bulk of them come under one or other of the same two categories, the amateur element largely predominating.

It would appear that, in existing circumstances, the main contribution of schools of art to the supply of industrial design is three-fold :—

(*a*) The part time instruction, mainly in evening classes, of persons already engaged in industry as apprentices or learners who wish to supplement the training they receive in the workshop or design studio by school classes in some branch of art or craft bearing on their work. These persons are to be

found under the fifth heading of the above table, and the only criticism that arises on the figures is that their average period of attendance seems somewhat inadequate.

(*b*) The teaching of drawing, colour work and modelling (irrespective of the occupation or intended career of the student) as the indispensable foundation for the practice of all art or craft. This general teaching does not, of course, make trade designers, or decorators, but it may do much to facilitate the selection of the right boys to be apprenticed or otherwise trained as designers or decorators, and to assist them in taking advantage of such training.

(*c*) In a few cases, the whole-time instruction of students under 16 in "junior day technical schools" having definite relations to particular industries, such as those for silversmiths and book production at the London Central School of Arts and Crafts, or in junior departments of schools of art as at Birmingham, Leicester and elsewhere.

In addition, the school of art may play a not unimportant part in the education of the consumer in the better appreciation of artistic quality, the results of which will eventually react on industry by an improved standard of demand. This education is, or should be, an important indirect "by-product" of the full-time or part time classes for non-industrial students and teachers. In existing circumstances the direct contribution of schools of art to the training of industrial designers through their full-time courses is (and perhaps must be) only of importance in the case of a few exceptional schools.

It is necessary to realise that, apart from all defects of method or co-operation, neither the existing demand for designers, nor any demand likely to materialise in the near future, could conceivably afford a career for more than a very small percentage of the 45,000 art students. Even if we made the entirely improbable assumption that the whole of the existing industrial demand for designs were supplied exclusively by designers recruited from students leaving the British schools of art, the entire annual industrial demand would not suffice to absorb more than a very small percentage of the students who leave those schools every year. It would, therefore, only lead to disappointment in present circumstances to set before all schools of art as their main purpose the training of students to become industrial designers.

Nevertheless, there is need for searching inquiry into the causes of the comparative weakness of the relation between many schools of art in large industrial districts and the local industries dependent on design. Without anticipating the conclusions which may result from such inquiry, it is permissible to suggest a doubt whether, unless in exceptional circumstances, the same school, or at all events the same branch or class, can supply successfully the very different needs of the teacher and the industrial and non-industrial student. Where we have noted a close and healthy connection

between the art schools and the local industries we have generally found that the schools have usually made industrial art their main if not their only objective.

No doubt manufacturers are sometimes unreasonable and expect from a lad fresh from the art school a knowledge of industrial technique or commercial conditions which only workshop experience can properly supply. On the other hand, some art masters and students are insufficiently sympathetic with the practical, economic or technical difficulties which prevent industries from being receptive to their abstract ideas of artistic design. This want of mutual comprehension frequently gives rise to an aloofness which is highly prejudicial both to the schools and to the industries. Art masters and students have to learn to understand the limitations imposed by industrial processes and commercial methods and conditions; manufacturers have to learn the limits of what can reasonably be expected of a school student before he enters the workshop, and to look rather for promising ideas and hints than for finished technique. Such mutual understanding is an essential condition of the growth of close and healthy co-operation, without which the present public expenditure on art teaching cannot possibly produce its full value. In some cases Consultative Committees representing the trades have been established with a view of promoting co-operation with the art schools, and the question whether and in what form and with what powers such committees can usefully be extended seems worthy of further examination. There can be little doubt that the haphazard methods by which the industrial designers are often at present recruited and trained in this country (differing in this respect widely from France) must tend to produce a narrowness of outlook and other defects in the workshop designing staffs, which have in turn encouraged the tendency of manufacturers in some industries to rely on the purchase of ready-made designs imported from abroad. This tendency again reacts on the position of the workshop designer, whose functions are more and more limited to those of a technical adapter instead of a creative artist. The suggested inquiry would explore all possible lines of advance, including such matters as the further development of the full time pre-apprenticeship school for students under 16, and the according of facilities for attendance at part time classes during working hours.

Attention may be called to an interesting experiment now being carried on by the Industrial Art Committee of the Federation of British Industries, which has established a "Schools of Art Students' Employment Bureau." During the first year of working (1924-5) 73 candidates for employment applied at the Bureau from 18 schools of art. Of these applicants, 16 were placed in situations and 8 were supplied with "free-lance" work, and, at the time of reporting, 8 cases were still under negotiation. The limited time during which the Bureau has operated makes it difficult to draw any decided inferences from its working, but it is of special interest owing to the character of the organisation by which it has been established.

The research we have suggested into the relations between the art schools and industries would have a strictly practical object, viz., the discovery and so far as possible the removal, trade by trade, of the difficulties which at present impede fuller co-operation. This inquiry would leave untouched another problem, which we commend for consideration, viz., how far schools of art in non-industrial districts (or the non-technical departments of such schools in industrial districts) are dealing effectively, or can be made to deal effectively, with the general and unspecialised problem of raising the general standard of appreciation of art among the general body of consumers

Museums of Industrial Art.

If, as we suggest above, there is need for further research with a view to developing co-operation between industries and schools of art, there is also need for inquiry as to the proper functions of art museums in relation to industry and industrial art training, the extent to which the existing system of museums in this country fulfils or falls short of fulfilling these functions, and the best means of making it more effective for the purpose. By industrial art museums is here meant collections of historical examples of works of craftsmanship and industrial art, as distinct from exhibitions of specimens of current art production. Museums and pictorial or other reproductions afford the two main methods of diffusing a knowledge of past styles and achievements, and inasmuch as all healthy development of design must grow directly or indirectly out of the past tradition, the study of past achievement should form an important part of the training and inspiration of a modern designer. This is the more important at the present day since our craft traditions have to a great extent been weakened or destroyed by the advent of the great machine-industry. It is, therefore, highly desirable to foster industrial art museums, both as a part of art training, and as a means by which industrial designers can keep in touch with the past and gain refreshment and stimulus from the contact.

At present the State encourages industrial art museums by the following methods :—

(*a*) It has established and supports the splendid collections in the Victoria and Albert Museum, London, which, both as regards contents and arrangement, can challenge comparison with the corresponding collections of any other country. The Museum was in 1925 visited by 1,190,707 persons, exclusive of a large number of visitors to the branch museum at Bethnal Green.

(*b*) In connection with this Museum there is an active Circulation Department which is entirely concerned in circulating to local museums, schools of art, secondary schools and training colleges, objects or travelling collections of objects suitable for

display in these institutions. In 1925 loans were issued to 213 schools of art, 30 training colleges, 285 secondary schools and 97 local museums. It is the practice in making loans to local museums to remind the Curator that in selecting specimens regard should be had to the needs of the local industries and art schools.

It seems clear that a great development of local interest, initiative, and organisation is still needed if the efforts of the Circulation Department are to bear adequate fruit. At present, such local activity is at a low ebb in places where one might expect it to flow strongly. For instance, there is no historic collection of textiles at Bradford, nor of carpets at Kidderminster. Generally speaking, the funds provided for the maintenance of local industrial art collections are inadequate, and the co-operation between many local museums and local industries is defective. With one or two exceptions (e.g., pottery and lace), the surveys do not suggest that provincial art museums play an important part in relation to current industrial art and the industries dependent thereon.

In the matter of provincial museums of industrial art, Great Britain does not compare well with such continental countries as Germany and Switzerland. No doubt there are in some cases special reasons for the difference: e.g., many of the local German collections are in State capitals. It is apparent, however, that without a fresh local development the efforts of the Circulation Department must be largely nugatory. The problem of strengthening and developing local museums of industrial art and bringing them into closer touch with local industry is one which can hardly be solved by the efforts of any central organisation, but needs systematic and intelligent local effort and interest.

We would add that any further research which may be undertaken on this subject should deal not only with the question of affording fuller facilities to industry in the matter of collections of historic art, but also with the more difficult problem of the right use to be made of the collections by modern industry. Too often, at present, such limited use as is made of a museum is for the purpose of copying rather than of inspiration.

Conclusion.

We may summarise briefly the practical conclusions arising from our surveys as follows.

In our opinion, modern tendencies in certain trades to sever design from manufacture, and to rely unduly on foreign sources for the former, involve serious danger to the well-being of the national industries and arts. It is highly desirable in the interests both of British trade and of British industrial art to counteract these tendencies, and to encourage British manufacturers to attach much more importance than at present to the strengthening of their own designing staffs, and to the development and fuller use of the

creative powers of their designers, so as to impress a British style and tradition of design on British made products.

For the above purpose it is necessary to pursue and complete the inquiries which we have initiated, and to follow up the results of these inquiries by practical action. The following matters, for example, appear to be among those most urgently in need of further research :—

(*a*) The functions, status, scope and responsibility assigned under present conditions to the workshop designer in various branches of industry dependent on design, with a view to discovering and removing any defects which may impede the achievement of the above-mentioned objects.

(*b*) The relations between schools of art, especially those in industrial districts, and local industries dependent on design, with a view to discovering and removing any obstacles which at present impede full co-operation between them.

(*c*) The relations between industrial art museums and industries dependent on design, with a view to defining the right functions of such museums in relation to industries and industrial training, and to securing that these functions shall be fully and adequately fulfilled.

All the above subjects are included in the programme of research recently drawn up by the British Institute of Industrial Art. The experience of the Institute proves, however, that the desired ends are not likely to be achieved merely by holding inquiries and drawing up reports, but that it is absolutely essential to follow up each inquiry by holding conferences with representatives of the industries concerned and also with educational authorities, teachers, designers, traders and others, either singly or together, so as to discuss and remove any practical difficulties which may arise in the application of remedies in a manner suited to each particular branch of industry.

Finally, it should be remarked that the present survey is concerned wholly with the position of industrial art in relation to *productive* industry. We are fully aware that there is another aspect of the problem, which in relation to certain branches of industry may be of crucial importance, viz., the position of industrial art in relation to the *distributive* trades. There is no doubt that the tendency of modern industrial and commercial organisation to widen the gap between the original producer and the ultimate consumer has thrown into the hands of intermediate buyers and salesmen, both wholesale and retail, an increasing power of influencing, for good or ill, the standard and trend of current industrial art. There is, therefore, an urgent need to consider how far and by what methods of training it may be possible to ensure that this power shall be used with intelligence, sympathy and vision. This whole question of the art education of the middleman is at present under investigation by a special committee of the Institute.

ANNEX.

INDUSTRIAL ART IN INDIVIDUAL INDUSTRIES.

A. TEXTILES.

(1) Printed Cloth—Calico, Silk, Artificial Silk, Velvet and Velveteen.

Raw cotton passes through many hands before it reaches a shop as printed calico. Spinning, weaving, bleaching, dyeing, printing and marketing are usually carried on by different firms, though one firm may combine several processes.

The firms which have the greatest influence on design are the printers. Sometimes, however, weavers who send their cloth out to be printed supply the design; sometimes it is supplied by the merchant. All the people concerned with the cloth after the printing stage have a certain amount of influence on the design, even though not directly concerned with its production.

Markets.—The great bulk of the Manchester printed cotton trade is concerned with the export market. In the matter of design the world market for dress goods may be very roughly divided into two classes, one being mainly inspired by Paris and the other being inspired by the native tradition of the particular market. The first class includes the home trade, which is more or less directly under the influence of Paris dress fashions. The same applies to design for most European countries, and for the European population in the British Dominions and Colonies. With a few local variations, South America and the West Indies demand a European design.

Cloth of traditional native design is sold to the Indian, African and Chinaman, though the last named has, during the last fifteen years, shown an increasing preference for European design.

Furnishing fabrics are chiefly sold in the home and European markets and in the Dominions and Colonies. Fashions in these fabrics change less rapidly than in dress materials, and though many designs come from Paris, the predominating influence is British.

Technical Processes and Limitations.—Design for printed calico has few technical limitations. Provided that it is made to fit the roller, almost anything that can be drawn can be printed; a design must, however, repeat in units or fractions of the circumference and width of the roller. Economy of design is studied so as to obtain the desired effect with as few colours as possible, and the effect of one colour upon another has to be considered.

A good deal of high-class work is printed by means of hand blocks. This form of printing, which has grown in popularity during recent years, gives a certain texture and unevenness to the print, but the design has to conform to the same general conditions as in printing from copper rollers, except that a wider radius of "repeat" can be used.

"Batik" is a method of printing with a wax coating on each side of the cloth, which acts as a sort of stencil, the cloth being dipped into dye. Where the wax cracks the dye penetrates, giving a characteristic surface. This method has been practised for a number of years for the African markets and has recently become popular in England. Some firms produce imitation "Batik" designs which are printed upon rollers in the usual manner.

"Resist" printing consists of printing a "resist" instead of ink on to a coloured cloth on rollers in the ordinary way, the "resist" taking the ground out of the cloth and leaving its own colour when dry.

Sources of Design.—Paris is the centre in which the germ of a new style or fashion in dress materials is born. New patterns emanate from exclusive dress designers and cotton fashions generally follow those in silk. The fashion reaches England through various sources, e.g., an English house may send a representative to Paris once or twice a year to observe what is worn and to buy designs from a French atelier, or, in other cases, the Paris Agent may send samples of new materials for the information of the British firm; sometimes designs are obtained from French designers visiting Manchester. There are firms in Paris who buy samples of all the best designs in printed or woven silks which they send to their customers.

The design in other cases is evolved in Manchester, the style being usually determined by the manager, who gives his ideas either to a designer in the employ of the company or to a free-lance designer. Firms dealing with the cheaper sections of the home market do not get their ideas direct from Paris, but follow the productions of better firms, ideas being either collected by the manager or salesman or sent to the firm by its agents.

Only two of the fourteen typical firms visited buy any quantity of designs from London, and these are mainly for furnishing fabrics. They are bought from painters, free-lance designers, design studios, and occasionally from art students. French designs for furnishing fabrics are often bought, but the influence in these cases is usually English.

Books and museums must also be included among the sources from which designs are obtained, e.g., old pattern-books of, say, fifty years ago, are used to give suggestions for modern work. Most large studios have a library of books on textile design and historical styles, Chinese and Japanese pattern books, and books on other phases of decorative art which might be useful in giving suggestions.

The majority of designs in "native" styles are produced in Manchester. Books and native examples are used to a small extent, but these designs are usually traditional and done by a designer who has become thoroughly accustomed to working in the native manner. Some firms deal exclusively with a particular market. In one firm which was visited there were three designers who had a freer hand than usual, and who produced designs of a good quality for the African native.

As to the sources of design, statistics compiled from fourteen calico printing firms show that 42 per cent. of designs were produced by their own staff, 13 per cent. were bought from Manchester ateliers, 42 per cent. from Paris ateliers, and the remaining 3 per cent. from free-lance artists in London and elsewhere. As the firms visited, however, dealt principally with the home market, these figures probably exaggerate the dependence of the cotton trade on Paris.

Production of a Design.—For each design a series of drawings is done showing variations of the colour scheme. The designer, however, does not make a separate drawing for each colour or roller: the colour spaces are planned out in engraving. When proper care is not taken, the design may be completely changed or destroyed by varying the colour values. In most cases the draughtsman or designer attached to a firm is completely cut off both from the outside designer and from the factory, and works to the orders either of the head salesmen of the different departments or of the manager. Agents with a large native market, such as China or India, have native draughtsmen who draw designs to send to the printers as suggestions.

After the drawings are finished, the design is sent to the factory to be engraved. There are several methods of carrying out this process. A simple design is traced on paper to a zinc plate, which forms a guide for etching it on the roller by the pantograph machine. In the case of a more complicated design it is projected by a lantern on to the zinc plate to, say, five times its size, where it is traced by the sketch makers. This has to be done in a room to which no light is admitted, and is extremely close work, involving a certain

amount of ability in drawing, as the sketch makers sometimes have to alter the size or arrangement of a design to make it fit the roller. These sketch makers are trained by apprenticeship for five years, after which they earn an average of £4 per week.

The shades of colour to be used are communicated to the factory by means of pattern books and samples from other patterns, the colours of which are numbered. In most cases this is done under the supervision of the manager of the department.

Number and variety of designs.—Any number of new designs up to 1,000 may be produced per year according to the market or the demand. The greatest variation in design is demanded by the home trade in dress materials. Most firms chiefly concerned with furnishing fabrics produce from 20 to 200 designs a year. The manager of one firm stated that more designs were produced when trade was bad than when it was good, and that during the trade boom in 1919–20 the amount spent by his firm on engraving new designs was one-fifth of that spent in the succeeding year. Designs for dress goods in the home trade rarely last more than one year in the same market. They may be printed a second year for a different market, or they may be taken off for a year or two and re-introduced. Certain designs for shirtings, maids' print dresses, furnishing fabrics, and much of the export trade persist for several years. Some popular designs for furnishing fabrics may last as long as 30 years.

Cost of engraving.—The cost of engraving a design is from £5 to £10 per roller, a separate roller being needed for each colour.

The more expensive design costs more to engrave owing to the number of colours used, but the cheapest cloth to engrave is usually for a market which will allow only the smallest possible margin of profit. The quantity of cloth to be printed to make a design worth while varies between 50,000 yards (for the cheapest Indian market) and 3,000 yards (cretonnes, etc., for the home trade) or even less in special cases of high quality work.

Registration.—The majority of firms register their designs,* except very simple stripe patterns. The firms which produce the most striking and original designs attach least importance to registration, their policy being always to improve on what they have done before. Consequently, by the time a copy has been made by another firm, they are producing something fresh.

Purchase of designs.—Speaking generally, designs are selected and purchased by the heads of departments or, in small firms, by the manager. They obtain their knowledge of design by experience of the trade and rarely have any artistic training. In firms which deal with the high-class home market, they visit the Paris ateliers and select designs ; other firms buy the designs from representatives of the ateliers who visit Manchester once or twice a year. If a design be needed in a hurry, a written description of what is required, together with samples of other designs somewhat similar, perhaps supplemented by rough sketches, is sent over to Paris. An atelier, if it is to keep its clients, must not sell designs which are too much alike to different firms. Most French ateliers are very versatile, producing all kinds of designs, from exclusive patterns of high value to designs in very poor taste.

Prices paid to outside designers.—The prices paid for designs vary from £1 1*s.* (for a stripe pattern for shirting) to £50 (this is an extreme figure for a very large pattern of original character). Some firms fix a maximum price, say £5, whereas others will pay almost any amount to secure a design which they want. Prices have risen considerably since the war and the normal price paid for designs for dress goods is from £3 10*s.* to £4 10*s.*, while for furnishing fabrics it is about £15.

* Throughout these Surveys, registration of designs means registration at the Patent Office under the Patents and Designs Acts, 1907 & 1919.

Formerly designs bought in Paris generally had to be adapted, but the tendency towards standardised machinery and the increased practical knowledge of the ateliers have, generally speaking, made this unnecessary to-day. Usually only one colouring of a design is bought in Paris, the other schemes being worked out by the firm's designer. Manchester studios, however, frequently supply a complete set of colourings for one design.

Position of the designer.—Although, in the opinion of many managers, design is the most important part of the business, the designer is a comparatively unimportant person. In many firms the manager is much more alive to the interest and possibilities of design than the designer. The reasons for this are, first, that the average draughtsman, even when capable of creating a fresh design, has neither the experience of the market possessed by the manager or salesman, nor the opportunity of acquiring it, and secondly, that for the greater proportion of the market, the need for new designs is not felt. Reasons given by various managers for the prevalent custom of buying French designs are that Paris is the spot where fashions are born, and that the French designs are intrinsically better. Paris is the centre for design as Manchester is for manufacture. The environment has a great deal to do with this. Managers state that the Manchester designers have little chance of seeing fashion and beauty, whereas the Parisian has only to walk along the streets or to look into shop windows to gain inspiration. Frenchmen working in Manchester are said to lose their native gifts after three or four years. The buying of designs in Paris has, however, many disadvantages, and a British firm cannot produce work with an individual stamp in this way.

Design Studios.—Three design studios were visited, employing altogether 65 men, of whom 50 per cent. are what are known as finishers, who are employed to finish work begun by the head designers, 30–40 per cent. are designers, and the remainder are apprentices. Rates of pay have risen considerably since the war. A boy commences at a salary of 8*s.* to 10*s.* a week, and at the age of 23 should be able to earn £3 10*s.* a week as a designer. After that his salary may rise to £6 a week, increases usually being upon a regular scale with special bonuses for merit. Finishers are paid £2 17*d.* 6*s.* per week. The studios work to regular hours, with no overtime.

The work of the head of the studio consists of interviewing clients, ascertaining their requirements and giving instructions and suggestions to the designers how to carry them out. He himself has no time to design, and seldom does even a rough sketch. Heads of studios have in most cases started as designers in the ordinary manner, and have then been able to set up a business of their own, either by means of pecuniary advantages or by the possession of more than the average amount of business acumen. They have concentrated their energies on studying taste, fashion, and styles of design, and on developing their critical faculties, rather than on producing designs themselves. The senior designers have usually their own special line—such as designs for the Indian or Chinese markets in striped shirtings or cretonnes. Designs in the larger Manchester studios are usually done to order; only the smaller designers and those trying to form a connection produce speculative designs and hawk them round.

It may be added here that designers attached to a firm are drawn from the same sources, work under the same conditions and are paid at the same rates as those in outside studios.

Training of Designers.—The majority of designers come straight from school, and commence by drawing flowers, copying pictures and designs, and doing odd jobs in the studio. They then learn to trace and colour out, and after five or six years should be in the position of designers.

Generally speaking, a designer who has been apprenticed is preferred to one who has attended an art school for two or three years, as he will probably have a better grasp of what is required than anyone straight from an art school. His general art training, however, is usually very weak. In two of the three studios visited apprentices are encouraged to supplement their training in the studios by work at the art school, but the head of the third studio has stopped sending apprentices to the art schools. It is said that the art school students do not learn the technical requirements with reference to repeats and colouring. Another criticism is that school of art students are not sufficiently familiar with modern design, since the schools of art themselves are often out of touch with modern ideas. Some firms feel that the schools make a designer look down upon commercial work and cause him to become dissatisfied with his position, and some, who wish to employ a creative designer, say that they can seldom find what they require in the local schools. On the other hand, one art master stated that very often full-time students who are good textile designers have their creative ability knocked out of them by the routine work in the factory.

Relation of Supply of Designers to Demand.—It is generally stated that there is a plentiful supply of mediocre designers, but that good, keen, energetic designers are rare. All the designers in the firms visited were British with the exception of one Japanese.

Conditions of Work.—A desire to improve the existing conditions as regards design has been found among the more far-sighted manufacturers who realise that the production of a high-quality fabric calls for more than just the employment of a good designer. A co-operative effort by everyone, manager, salesman, factory manager, chemist, engraver, right down to the man who works the printing machine, is needed. A factory doing the poorer classes of work, if suddenly given a good design, will probably spoil it. Design is but a small part of the business of the works and, perhaps, from their point of view, unprofitable. After two or three failures a firm sometimes gives up trying.

An interesting experiment is the employment by an Association of a colour expert to give a course of lectures on design and colour to the heads of firms (but not to the atelier or to the ordinary designers). The object of these lectures is not to lay down laws on the subject of colour-harmony or taste, but to awaken the sense of colour and form.

A company, willing to pay £500 per year for three days' work a week to an artist who is competent both to collect ideas on fashion and to produce good designs, state that they find it extremely hard to get anyone suitable who is willing to work in Manchester.

An artist is employed by one large firm to supervise the whole of the design side of the business, to train the designers under him in his methods and also to go to Paris to buy designs. He works in Manchester only a certain number of days a week, so that he has leisure to paint, and his work for the company is not confined to Manchester. A great deal has been done by this firm to improve the atmosphere in which the designers work by making their surroundings clean and bright, with flowers about the room, and in allowing them elasticity; but in many firms the importance of congenial atmosphere in the production of design is not sufficiently realised.

The head designer for another important firm lives and works in the country, and the head of the firm, the London manager, and the designer confer periodically. Though this particular factory is one which makes a great feature of hand block work, it is considered sufficient for the designer to visit the factory three times a year. He also does other kinds of art work, but the firm have a monopoly of his textile designs. Other designers work at the factory under his supervision.

(2) Woven Designs.

Silk Furnishing Fabrics.—This trade is confined to a few firms producing silks of a high artistic quality. A large quantity of silk furnishing fabrics is imported from France and Italy. One firm only was visited as being the most representative.

Success in this class of work depends largely upon the quality of the yarn, the dyeing and method of cloth construction.

Designs are produced by full-time designers. The conception of the design proceeds from the director, who possesses the experience of many years added to an early training at the Textile School in Lyons. When the final design has been made it is drawn out on point paper, and is sent to the factory for the Jacquard cards to be cut.

Three designers and two draughtsmen are employed, one designer and the two draughtsmen at the London office, one designer at his own house and the other at the factory. They are not specialised to any extent, the object being to keep them as fresh as possible. The designers have all received an early training at an Art School, and it is stated that an early general art training is of the greatest value. It does not, however, enable a boy to become at once a qualified designer. There are technical limitations which make it necessary for the designer to spend two or three years in learning the processes of production.

No conferences between the designers and the factory manager are necessary, as the former know the technical side of their work well enough, but the designers are free to visit the factory from time to time in order to keep in touch with practical methods. Designs are occasionally made to customers' individual requirements or in collaboration with an architect or decorator. New designs are influenced to a large extent by fashions in decoration and furniture. Many period designs are made, and for this work the designers visit the museums.

Silk for Dress Materials, Ties, etc.—This is a comparatively small industry, centred in Macclesfield. The chief products are ties, scarves and materials for dressing gowns for men, ladies' dress materials, which are woven on power looms, and machine knitted silk for ties, dresses, scarves and jumpers. The modern tendency towards mass production, with its consequent splitting up of various functions into watertight compartments geographically separated, has not affected the industry to any great extent, and the feeling of craftsmanship is still alive. For the most part design is traditional and has developed directly from the methods of production.

The chief source of design is the full-time designer at the factory, where the management is also situated, so that the designer is in touch both with the management and the productive staff. The style of a new design is usually determined by the manager, who has often been a designer. French fashion is not followed to any appreciable extent, as English fashion leads the world. For women's dresses the silks are chiefly plain, or of simple stripe or check patterns which persist. In most cases new fashions are evolved in the factory. The motif of a design is not always provided by the manager, for a designer working in a traditional style and making the technical requirements his foundation is often capable of evolving fresh designs.

Designers must first of all possess thorough knowledge of the processes of production. Therefore, all designers have to have a thorough technical training. They are apprenticed for from five to seven years, during which time they spend four evenings a week at the local school of art and school of technology. These schools work side by side in close co-operation. At the one, the student learns all kinds of cloth construction, its composition and the methods of spinning and weaving; at the other, he learns the elements of drawing and design and develops his colour sense. The manufacturers and the Macclesfield schools also work in close co-operation. Some of the leading

manufacturers are old students and governors of the art school and the art master is a professional textile designer. All the designers (about two a year) who have had a preliminary full-time training in the schools are placed when they leave the school.

There exist three "free-lance" design studios in Macclesfield, whose designers have been through the usual training and are thoroughly practical men.

Formerly, French designs were bought, but this practice has now ceased, chiefly owing to the improved local training. Managers do, however, occasionally visit Paris to see their customers and to get ideas. None of the firms which were visited buy outside designs.

A large number of new designs are produced per year. One firm, employing 120–150 operatives and three designers, produces roughly 1,000 designs per year. One designer can supply, roughly, 60 operatives, including card-cutters, with designs. Designs very often persist from year to year, sometimes even as long as twenty years, the colour scheme being varied. Registration of designs is not a general practice.

In the case of one firm visited, which supplies the better class markets all over the world with silken dress fabrics of simple design, new designs are originated by the manager, who used to be responsible for all the designing work. He now gives his ideas to a designer, who has one assistant. By dealing directly with the larger retail houses, he is in contact with the man who sells the material, thus receiving ideas or instructions direct instead of through the medium of an agent. Suggestions for new styles emanate in many cases from the buyer. The designer is responsible for sketching new designs to show buyers and for the working drawings on point paper. He also does fashion-plate sketches which show how the material can be made up.

Carpets and Rugs.—A carpet factory is divided into separate departments for each class of work—Tapestry, Brussels, Wilton and Axminster—each with a separate organisation and designing staff. The best quality of design is done for the Axminster and Wilton, which are the more expensive carpets, and a lower quality of design for the Tapestry, which goes to a cheaper market.

Over each department is a junior director, who confers with the head designer of his department with reference to new designs. The whole administration, including the designing office, is at the factory.

Designs are obtained from the following sources :—

(1) Books and Museums.—The head designers occasionally visit the Victoria and Albert Museum in order to make sketches of old designs capable of being adapted. Period designs are chiefly used for the more expensive carpets. A library of books and museum catalogues of carpets is kept at the factory.

(2) Paris.—One firm visited obtains over 50 per cent. of its new ideas from a French designer, the same man being always employed by the firm.

A design which is purely a product of the imagination is very rare, but occasionally a new idea of colour, spacing or pattern will suggest itself, usually from something that has been seen, as for example, a new cretonne or wall-paper. Buyers also make suggestions and sometimes carpets are made to designs produced in the studios of firms who are responsible for all kinds of interior decoration and furniture.

For tapestry carpets which are woven with printed yarn, the design has to be mathematically worked out by the designer from the drawing on point paper and the process of printing is regulated by figures. For woven patterns which are done on Axminster or Jacquard looms, the design is also worked out on point paper.

In one firm there are 49 on the designing staff and 1,000 operatives. Of the 49, 14 are designers (6 being head designers) and the remainder are copyists who do not design but who work out and finish the point paper drawings of others. Two or three of the copyists are girls. The designers have all been trained by apprenticeship, in some cases supplemented by local art school training. They are paid on progressive rates of salary, up to £400 per year. Special bonuses are given to departments for increased sales. There is a shortage of good designers but a good supply of copyists. Designers usually remain designers all their lives.

Designs are not as a rule registered.

Counterpanes.—One firm producing woven counterpanes was visited. About 20 per cent. of their designs are bought from Paris for from £15 to £20 each. These are adapted and the working drawings made by factory designers. The remaining designs are evolved by the designing staff or are adapted either from designs purchased, or from old designs. New designs are produced on the initiative of the directors. There are about 20 designs in use for each quality of cloth. A good design will be on the market for twenty years.

Tapestries.—In the tapestry department of a large firm there is a designer who produces about one new design a week, and who is concerned with the supervision of card cutting. New ideas and original designs are obtained from France and elsewhere. Under the designer work one man and one girl.

Design does not play an important part in this class of work, as 80 per cent. of the work is plain. In one large firm less than a dozen designers are employed for 7,000 operatives. Each department is self-contained as regards design, there being no control organisation or head designer. The designers have in the past been apprentices with a small salary, who were encouraged to attend the school of technology for part time, the firm paying their fees. The designers work under the salesmen and the works manager, who supervise production. Salesmen and works managers have in some cases been trained as designers.

(3) Machine-made Lace.

The machine-made lace industry, which is centred in Nottingham, is at present very depressed, owing partly to changes of fashion, which affect the use of lace generally, and partly to the severity of French competition aided by the falling exchange. In lace manufacture the chief classes concerned are the makers, who produce the lace "in the brown," i.e., undyed and unbleached, and the finishers, by whom it is bleached, dyed and divided into [illegible]

As regards the supply of designs, most makers of any size employ a full-time designer, and also a number of "designer draughtsmen." The latter enter the designing office as learners and are trained for seven years (from 14 to 21). Designs are also purchased from trade designers in Nottingham, but not to any appreciable extent from organised "design studios" as in Switzerland. Probably at least four-fifths of the designs are British, but a certain number of French designs are used, and some firms and trade designers keep in touch with Paris or Calais, which is the principal centre of the French industry. Besides creating new designs in the workshop and purchasing from outside, manufacturers also utilise German, Swiss and Austrian lace and books on lace; in addition they are more or less helped by "clipping agents," mostly French, who supply cuttings of the latest productions. Some firms collect specimens of hand-made lace and many factories have good libraries and records in the shape of samples and patterns. The adaptation of designs to manufacturing requirements is a highly technical matter, and is the function of the "designer draughtsmen." The chief designer draughtsman in a firm occupies an important position, and is always more highly paid than the workshop designer. Subject, of course, to the employer, the designer draughtsman supervises the production of the patterns until they

are successfully carried out and marketed. He also co-operates with the employer in selecting designs for purchase. The designing and draughting staff average about 15 per cent. of the making staff, but not more than 5 per cent. of the total personnel of the undertaking. A designer or designer draughtsman is paid from £200 to £600 or more per year after his period of learnership.

There is a good School of Art at Nottingham whose head was once in the lace trade, and whose chief design-master is at present in the business. The school is specially fitted with lace machinery and has an excellent Art Library. At present, however, there are not more than 20 lace design students, compared with 100 formerly. No doubt the dark prospects of the industry at present have something to do with this. A certain use is made of Art Museums to study the technique of hand-made lace and to derive hints for designs.

Considerable use is made of the protection afforded to designs by registration under the Patents and Designs Act, the number of registrations of lace designs being something over 30 per week.

The productions of machine lace are so very much cheaper than hand lace (e.g. 1*s.* 4½*d.* compared with £5 per yard) that they appeal on the whole to a quite different market. Nevertheless it is not uncommon for firms to send prospective buyers samples both of hand and of machine lace for purposes of comparison.

B. FURNITURE.

All the higher class furniture manufacturers employ designers trained in the historical styles of furniture. This training is, however, seldom used as the foundation for modern design. There are two main reasons for this :— First, timidity on the part of retailers and manufacturers in launching on the market something which has not already proved saleable, and secondly, the divorce of the designer from construction. The design no longer grows naturally out of the construction, as was the case when a craftsman designed and made a piece himself.

The most expensive trade furniture consists of literal reproductions of antiques, and antique dealing is often part of the business.

With a few exceptions, the subservience to the "antique" extends downwards through the trade with a lessening accuracy and refinement owing to considerations of cost and mass production.

Organisation of designing staff in firms who do interior decoration and who are retailers as well as manufacturers.—Higher grade furniture is designed by whole-time designers employed by the firms. In a large studio attached to a manufacturing and retailing firm concerned with interior decoration generally, the men are trained to undertake any type of work, from structural alterations to stained glass or even figure drawing for posters and bookplates. The designs for furniture are drawn out and sent to the factory in the provinces, and are not seen again until the finished work comes back to the showrooms. Boys are taken from all classes of school upon showing an aptitude for drawing. After five years the pupil has become a senior designer, capable of doing water-colour perspective drawings of interior decorative schemes, working drawings for furniture and textiles, and almost any other kind of design. If a pupil has not the qualities which will ensure his becoming of value to the firm his training is not proceeded with. Museums are used, not so much for the reproduction *in toto* of actual pieces, as for the study of the details of particular periods. Pupils are sent about once a week to study and measure, but always with some definite object to observe. All the better studios have a good library, containing standard books and periodicals on furniture, architecture and decoration, both British and foreign. Whether the library is used for providing designs or for widening outlook and giving inspiration depends upon the tradition of the house.

The study of architecture and drawing from life in the art schools is regarded as useful. The latter gives the designer firmness of touch for the drawing of subtle curves. Some students learn to make furniture at evening classes, but this does not seem to be regarded as essential, as they are usually given a thorough training in construction in the studio.

In the best firms, designs for furniture are drawn first to the scale of one inch to one foot and then to full size, showing all joints, dovetailing, etc. In other firms the full size drawings show only the correct profile of the mouldings, the structural details being settled at the works. A designer is expected to design all classes of furniture.

Generally speaking, historical styles form the basis of all furniture design. Motifs are worked upon to suit modern requirements and new forms emerge. For instance, while the "William and Mary" dressing-table is very popular, there is no demand for the four-poster bed of the period. A type of bed is therefore designed of modern height and construction, and perhaps having the ends adapted from a "William and Mary" mirror.

Firms producing furniture only.—The above section, *mutatis mutandis*, also describes the practice of firms solely engaged in the production of better class furniture. In some of these firms there is a tendency to design furniture without an adequate appreciation of its ultimate place as part of a furnished room. This danger is not present when the studio is attached to the retail shop, for in that case the designer is generally engaged in evolving a complete scheme of decoration.

In one firm visited, employing three designers, one is in charge of special order work, while the other two work under his direction. Of these two, one has been trained at the bench and is chiefly concerned with pieces for multiple production, and the other is an apprentice draughtsman who traces drawings and makes full-sized details.

In some cases designs are made by draughtsmen from ideas supplied by the managing director.

Some commercial furniture makers realise that most of their work is in bad taste, but they consider that they have found by experience what the public wants. The criteria are cheapness, as much ornament as can be applied for the money, and conformity to the prevailing fashion and to a certain established idea of proportion learnt by experience of popular taste.

Carving.—In some firms a drawing is first of all made for the carver to work to, in others the carving is left entirely to the craftsman. In spite of, or perhaps in consequence of, the limited demand for this class of work, it is often difficult to obtain men who can do elaborate carving. It is stated that the number of boys being apprenticed as carvers to-day is only one-tenth of the number of men employed.

Administration.—The demand for new designs comes to the studio either from the management, or from individual clients. Sometimes the latter are introduced to the designer. In most large firms the demand comes from the salesman through the head of the studio to the designer. Instructions are not always clearly conveyed, owing to lack of technical knowledge on the part of the salesman. One firm has got over this difficulty by giving both the salesman and the designer the same training for the first two years.

Although he may have no artistic qualifications, the managing director usually has a strong influence on the character of the work.

Sources from which Designers are obtained.—It is stated by one large firm engaged in interior decoration, that the best results have been obtained from boys taken straight from a public school between the ages of 16 and 18, with no special training in drawing. Another firm state that they have obtained better results from elementary schoolboys, because they are harder workers, and "have no false ideas." A boy who has won a scholarship for cabinet-making from an elementary school to a technical institute, or who has been a workshop draughtsman in a country firm, realises that he has

a good opportunity in being trained at a first-class house, and makes the best of it. It is stated by this firm that eight years are required to train a designer. Other firms do not mind particularly what class the beginners are drawn from. Foreigners are rarely employed.

Supply of Designers.—There appears to be a good supply of designers of the draughtsman class. Owing to the fact that fewer persons have been apprenticed since the war the better men are not too common. The best furniture designers often go to America because the salaries there are higher.

The employment of full-time designers is more common than it used to be, and the outside designer has dropped out accordingly.

Art Schools.—An art school training in furniture design does not qualify a boy to take a post as a designer immediately on leaving the school, but most managers are agreed that the schools which specialize in furniture, e.g. the Shoreditch Technical Institute and the L.C.C. Central School of Arts and Crafts, give a good foundation. Most employers encourage their juniors to study in the evening.

Control of Designer over the methods of production.—Generally speaking, the designer has little control over the methods of production. At the lower grade houses the designs are very often changed during the making. One manager gave the opinion that the more divorced the artist was from the factory the better.

In one firm producing expensive period furniture, before a piece is made, a conference is held in the drawing office between the factory manager and the designer about the jointing and the building of intricate parts. The designer is in direct touch with the customer and the factory manager, and selects the veneers for particular pieces. In another firm where the factory is separated from the designing office, any alteration in construction at the works has to be reported to the designer. The factory manager has no voice in the forming of a design, and carries out the drawings of the designer implicitly.

It is very rare to find a special type of design for machine-made furniture. Too often, instead of having designs which can be easily and effectively carried out, an imitation of some more expensive piece is made with cheaper ornament and of less durable construction.

Remuneration and Qualification.—Before the war, large houses were wont to engage articled pupils, starting either by paying a premium or with no salary. This practice appears to have been discontinued, and beginners are now paid from 10s. to 30s. a week. The salary is then progressive, rising to £400 or £500 a year, and in the case of expert men, to £700, £800 or £1,000 a year or more as head designers. Managers are unanimous in saying that it is a progressive profession for the right man. There are no fixed rates of increase in salary, which is always based on merit.

A very important qualification for a designer from the point of view of the manager is said to be speed. A draughtsman is stated to be twice as quick between the ages of 30 and 40 as between 20 and 30.

Firms who employ no Designer.—These constitute the larger proportion of furniture makers. Nearly all the little masters in Hoxton and most of the High Wycombe firms belong to this class. There are not more than six firms in High Wycombe who employ designers.

Designs are produced in this class of firm :—

(1) From suggestions or designs made by the large houses which buy the furniture.

(2) From the verbal instructions of the manager to the shop foreman. The ideas of the former are often gleaned from other people's catalogues and from salerooms. A common method of working is to compare photographs or impressions of a particular type of chair, e.g. the adjustable easy chair, and to see if there is any respect in which the design can be improved and the cost reduced.

(3) From outside designers. As a rule it is designs for the cheaper class of furniture which come from this source.

The rates paid to outside designers are low. They vary from 3*s.* for a 1-in. scale drawing or a perspective of a suite, to 30*s.* for a 1-in. scale and full-size drawings of a single article.

Drawings are produced :—

(1) In their spare time by men employed as designers all day.
(2) By out-of-work designers.
(3) By free-lance designers.

Often the full-size details need adaptation, which is done by the shop foreman in setting out, or by some employee with a knowledge of draughtsmanship. Some few firms employ a draughtsman in addition to buying outside designs. Very often a designer is employed in order that the firm may have a " picture " to show a client. The heads of the firms who are responsible for the designs have rarely any artistic qualifications.

In conclusion, reference should be made to two outstanding firms of high-class furniture makers which employ no designer. In both of these firms the designs emanate from the director, who gives his instructions to the shop foreman, who then submits the full-size details and setting-out for his approval. Sometimes a model is made for further consideration. In one of the firms the manager and head salesman of the cabinet department also originate new pieces in collaboration with the director. They employ a draughtsman, but chiefly for putting ideas on paper to show to clients. There is also a staff of lady decorators to paint deal furniture, who are left to evolve their own designs under the direction of the head decorator. These ladies are usually taken quite young after some experience in an art school, and trained to the firm's methods. The other of the two firms produces some simple designs, working in a traditional manner without being enslaved by style. As regards price, their furniture stands midway between the mass products and the designs made to order by other firms.

Registration of Designs.—Only three of the firms visited make a practice of registering designs, and one of these registers only their more original productions. The life of a design is practically unlimited, and the most popular pieces may survive 30 years or more.

General Comments by Designers and Manufacturers.—Men working in the studios occasionally express the following grievances :—

1. They are limited in scope and individual effort, and too much bound by the methods of the head of the studio.

2. They do not get adequate salaries or recognition. If they design a first-rate piece it is only the head of the studio who gets any credit for it.

The directors of furniture-making firms on the whole affirm that they are satisfied with the furniture they produce. Occasionally one finds a firm who regard the standard of modern furniture design as being very low, and who consider that it is caused by lack of taste on the part of the retailer and not on the part of the public, who never get a chance to make their taste known. A retailer will always prefer something similar to what has sold well before. If a piece has the label of a particular style it makes matters far easier for the salesman, who is usually without knowledge of furniture. It is generally found that fashions in periods change in five to ten years. A style becomes fashionable among the wealthy classes, then popular, and finally vulgar, when another fashion is introduced. Changing conditions have a direct bearing on design. The price of building and the consequent necessity for smaller houses has affected the size and form of furniture. The fact that every house, however small, now contains a bathroom is doing away with the necessity for wash-stands. Lack of domestic help creates a demand for simple, easily cleaned furniture with absence of carved detail.

Managers have expressed their opinion that not nearly enough cabinet-makers are being trained, and that, while under the piece-work system of payment it was worth a foreman's while to train a boy, now that he is paid by day work the boy is only a nuisance to him.

POTTERY.

Types of Pottery and Design.—The most expensive dinner ware is made exclusively for the American market. Some of the designs for this class of work are very complicated and demand a high degree of skill in the decorator. Sometimes the pattern is etched into the ware with acid and then gilded and burnished.

Good class table-ware for the English market is printed in a single colour from an engraved copper plate. It may then be hand-painted in the "biscuit" state, after which it is glazed and fired. Entirely hand-painted work is done to quite a large extent both on and under the glaze.

By far the largest proportion of cheap pottery is decorated by means of lithographic transfers which can reproduce any number of colours. These are usually designed and manufactured by firms who do nothing else. Before the war most of the transfers came from Germany, but they are now made in England at a greatly increased cost. One result of this is that, except in factories which deal in mass production, hand-work and engraved-work are on a better competitive basis with transfers on the question of price, and the makers of the latter are being forced to improve their quality of design.

Subject to the limitations involved in designing the sections to fit together easily, and the commercial necessity of getting the maximum effect with the minimum number of colours, the whole range of decorative design is capable of application to transfer making.

Decorative pottery gives scope for the use of coloured glazes, lustres and chemical effects. Applied modelling is not employed to any very great extent, though embossed patterns are often used. Jasper ware is almost the only example of any extensive use of applied modelling, and for this work casts are used which, almost without exception, are made from the original models done as long as a hundred years ago.

Sources of Design.—The sources of design in pottery may be divided under three main heads :—

(1) The professional designer, either employed by the pottery or from outside.
(2) Old designs either reproduced *in toto* or adapted.
(3) The lithographic transfer makers, who do their own designs.

The first is the system adopted by all the first and most of the second class firms, but fewer firms design their own shapes than design their own patterns. In fifteen firms visited, all employing designers, there were only seven modellers. Most firms produce one shape in each class of table ware per year, and for this they are forced to depend on outside men.

The designer's duties are to design new shapes and patterns and to supervise the making from the point of view of workmanship. The designer usually makes a line drawing of a new shape, which he gives to the modeller. The model is then submitted to him and, perhaps, to the managing director or even to the travellers or buyers. When it has been approved and the final model made, the designer tries out rough patterns on it. If it is to be hand-painted, he usually finishes the painting himself, and gives it to the decorator to copy, but sometimes he makes a rough charcoal sketch which is worked out by a draughtsman or decorator. If it is to be engraved and printed he makes a careful scale drawing of the pattern for the engraver. If it is to be painted over the engraved line, he either completes a pattern himself for the decorator to work from, or he asks the foreman or forewoman decorator to work out two or three trial colour schemes from his suggestions.

The conception of the general style of a new design sometimes originates with the designer, but more often the traveller or buyer demands a particular style.

Purely decorative work, such as statuettes, is often bought from sculptors, studio potters, and art students.

One or two firms lead the way in determining the general trend of design, and the better firms, though they depend for their profit largely upon their accepted types of table-ware, experiment in various directions, trying to create new demand by the introduction of new designs. The designer usually has control over the factory in all matters relating to design, and is often concerned in the supervision of the chemical processes involved in the making of glazes.

Three cases were met with where the standard of design has been greatly improved by the employment of a new designer, and the firm's profits have shown a corresponding increase. Two of the three designers concerned were engaged by the firms with no previous experience of pottery. The other was brought up in the potteries, and, having been trained both as an artist and as a chemist, is competent to combine the functions of factory manager and designer.

In one large firm the character of their design has been gradually revolutionised by introducing good simple shapes and patterns carefully spaced and planned to fit the shape. The possibilities of the chrome lithograph are also being developed with very good results. They are all made on the premises by the firm's lithographer.

Several firms are chiefly concerned with the reproduction of old patterns.

At one firm producing hand-painted lustre bowls and vases, the designers, who are also craftsmen, are encouraged to develop their own original ideas, and at the same time to work in close contact with each other and with the chief designer.

Another firm applies these methods to a cheaper class of work, three or four girls, who have been trained from the age of fourteen, being employed to decorate and design. They have been trained in the workshops, supplemented by the local art schools. The director finds that good new designs will sell well, when once they have got through the trade buyer. Opposition was overcome by exhibiting both locally and at London exhibitions. Transfer work is done for the cheaper market and brings in steady returns, thus allowing experiments to be made in other directions. The director selects the transfers himself, and considers that their quality is improving. He states that he finds it difficult to obtain girls who are worth training.

One firm stands midway between the studio and the commercial potter. Although it is a limited company employing 300 workmen, the director himself designs the shapes, mixes the colours and even regulates the firing of the kiln. His work is all hand thrown, for he believes that the public will always buy good work when they see it.

Occasionally a second grade firm with a large output will employ a designer who occupies a more important position and is on a higher salary than some of those who work for first grade firms. In the firms which produce pottery of a lower quality, however, one generally finds that the designer is relatively a much less important person or that he is combining other activities with design, e.g. supervision of the decorating department in the matter of wages, times, etc.; selection of designs from the lithographic transfer makers, arrangement of prices; watching the market to see what is selling well and what good new lines are brought out by other firms; or calculating the cost of new lines.

The designing done by this type of man chiefly consists of doing rough sketches for the outside engraver to work from. He usually starts when a boy as a decorator and works his way up. The chief source of inspiration is the product of the better class firms.

Many of the smaller factories cannot afford to employ a proper designer; and if they could he would probably overstock the factory with designs, particularly a factory where the transfer method is extensively used. Even in a first class firm only a small percentage of the designer's time is given to creating new designs.

Very few designs for ordinary pottery are bought from outside designers.

In one mass production firm with something like 1,000 operatives and no designer, the great majority of the work is done from transfers selected by the art director, who is, however, a man with no artistic training.

Lithographic Transfers.—Two makers of lithographic transfers were visited, both of whom design, lithograph and print the sheets themselves. An important firm will buy a whole issue (say 1,000 sheets) and register the design, whereas a small firm may buy only ten sheets, in which case other firms may use the same design. For simple articles designs are made to standard sizes, but when the shape requires a special design it is sent to the transfer makers for them to submit designs. Ten designers are employed in these two firms.

Designs are occasionally bought from artists who come to the door.

Motifs are drawn from all sources. Books on pottery, textiles and all sorts of decorative art are kept for inspiration. The designs are selected by the manager. In the case of one transfer-making company, the manager, who has no artistic training, considers that anyone not a professional designer is better equipped for selecting designs because he has less stereotyped ideas than the professional designer. The designers work under a disadvantage in never seeing their designs carried out, with the result that they are apt to lose touch with the quality and colour of pottery.

Influence of Methods of Production on Design.—Apart from the invention of transfers, modern methods of machine production have not directly affected the designs of pottery to any extent. The best designers work under very much the same conditions in relation to factory organisation as the designers of a hundred years ago. Forms which were originally hand-thrown are now made on a " jolly " without any appreciable difference in shape.

Designers.—Although in the opinion of some of the better manufacturers there is abundant scope for the right type of designer, the supply is fully equal to the demand as it stands at present. There is opportunity for absorbing about one fully trained designer per year. The lower grade designers are usually promoted from the decorating staff. The average salary paid to a designer is £400 or £500 per year, the starting salary being usually about £300 with promotion on a merit basis ; £800 is an outside figure.

The " Decorating Manager " type of designer is usually paid on the same basis as the other heads of departments such as the clay manager, i.e. about £300 a year.

Transfer designers are paid from £5 to £10 per week, but managers say that they would be willing to pay a much higher salary to a brilliant man. Promotion in these firms is on a merit basis.

Although only one concrete example has been met with, it is frequently stated that the best designers go to America.

Very few firms, except those which employ craftsmen-designers, have more than one designer, who may supply a factory employing up to 1,000 work-people. At one firm employing craftsmen-designers there are six designers to 400 operatives.

In the opinion of most directors a designer should be able to deal with all practical matters relating to pottery manufacture and should have been brought up in the trade. He should have a knowledge of all styles of pottery and should be, in addition, a good draughtsman and colourist, capable of putting his best into a design in the popular taste even though it does not appeal to him.

A few designers express dissatisfaction because the directors do not trust them as experts, but interfere and suggest alterations in their designs. The size, lighting and equipment of the room provided for the chief designers are often inadequate.

It is commonly stated both by managers and designers that both the public and the manufacturer are controlled by the travellers and buyers, who are very often men with no knowledge either of the technical or artistic side of pottery, and whose policy is therefore to concentrate on what has been known to sell before.

Training of Designers.—Nearly all the older designers have been brought up in the potteries, some having started as decorators and worked their way up. There is a system of scholarships which enables a boy to spend one or more days and several evenings a week in the art school while continuing his work in the factory. There are eight or nine Associates of the Royal College of Art now working in the pottery industry.

Four designers were met with who have come straight to their positions with no previous experience. Two had previously been textile designers, one an art master, and the fourth had come straight from the art school. All these had attended the Royal College of Art. Most directors have a strong bias against employing a man without previous experience of the trade.

The system of apprenticeship has died out. The directors have no desire to revive it, but they would like to be able to obtain some guarantee that their employees will not leave to go to a rival firm after two or three years' training.

The art director of one large firm states that, on the whole, boys who have worked in a factory from the age of fourteen have developed into better designers and craftsmen than those who have had the advantage of three years at a London art school. The fault of the latter is stated to be that they are not so capable of adapting themselves to commercial conditions, the methods learnt at an art school being stamped with the art school mark and too uncompromising to meet commercial requirements. All managers and designers, however, acknowledge the value of the art schools in training efficient decorators.

Modellers.—Two modellers were met with who had been trained at the Royal College of Art. One was working for a firm, the other was a "free lance" with three assistants. Other modellers attached both to firms and to outside men had been apprenticed to the trade.

Registration.—About 60 per cent. of the firms visited make a practice of registering their designs. This figure includes some of the better class firms, although they say that it is not really worth doing, their real safeguard being their standard of work and fertility of production.

General Conclusion.—In the main, it may be said that design in the pottery industry is receiving more rational and economic treatment, and much of the overloading of ornamentation in existence twenty years ago is disappearing. The actual manufacture has reached a very high level, and is probably the best in the world.

D. GLASSWARE.

The glassware industry is centred mainly in the neighbourhood of Stourbridge, though there are one or two important firms elsewhere. It has to meet strong foreign competition in what may be termed "middle-class" and in cheap goods, but comparatively little in the most costly kinds of glassware. Between one-quarter and one-third of high-class tableware is exported.

Sources from which Designs are obtained.—Glass firms, whatever their size, usually employ one designer,* under whom may be two learners. The designer usually spends only a small proportion of his time creating new designs, the remainder being employed in adapting new designs or in the shops supervising and improving.

Learners enter the trade as boys and their training in the work lasts five years. A vacancy in the position of a designer is usually filled by promoting an assistant or learner already in the works; it is seldom advertised or filled by the direct appointment of an artist or art student from outside.

Comparatively few designs are purchased from outside sources. Some experiments made in this direction before the war were not regarded as successful owing to the lack of artists who had specially studied glass design, and the tendency to reproduce pottery shapes.

* One old-established firm employs no designer, a member of the firm being responsible for most of the designs.

Museums are hardly used. One firm formerly sent selected people to London for a week each year, but this practice has fallen into disuse.

Training of Designers.—The chief designers have generally had an art training and they sometimes teach in the local art schools in their spare time. Some of the learners attend art schools, but the head of one firm who encouraged this by the payment of fees found that the lads dropped away, and the experiment failed. One general manager expressed the view that a comprehensive course of instruction in glass designing, including the practical limitations of glass decoration, would be of value to manufacturers. He regards the present art classes as inadequate for the purpose.

Status and Remuneration of Designers.—The status of a workshop designer is about equivalent to that of the foreman of the department. A successful designer may earn from £350 to £400 a year; assistants rise from 57*s.* a week at 21 years of age to £4 a week. There is no shortage of skilful cutters, but there is an opening for first-class engravers with an artistic training.

Functions of the Workshop Designer.—The designer works in close association with the foreman of the works department, who is a fine cutter, the result of this co-operation being often the simplification of a design. The initiative usually comes from a director or partner of a firm who may make suggestions after interviewing a customer or visiting a foreign market. The designer and works foreman in conference develop or improve on the suggestion and submit a detailed design from which, if approved, a trial piece is made. The designer supervises the work up to the completion and approval of the trial piece, after which the control of reproduction passes to the foreman.

Protection of Designs.—The registration of designs is now rare, as it is stated that evasion is easy by a slight change in the design and that proceedings for infringement against foreigners, even if successful, are unsatisfactory owing to the cost.

Recent Tendencies and Present Position.—As already stated, a considerable proportion of the output is exported, and each country insists on its own particular type of glass. The heads of firms have generally familiarised themselves by travel with the requirements of each market. The recent tendency has been towards simpler and less extravagant glass and there has been some abatement in the excessive gold decoration demanded in America.

Most of the leading firms sent representatives to study the Paris Exhibition, 1925, and learnt much from these visits as to foreign skill and design. There is evidence that both the Paris and New Zealand Exhibitions have resulted in numerous orders to British glass makers.

The principal firms recognise that there is a lack of initiative in putting new designs on the market. They attribute this largely to the discouraging attitude of the buyers of British distributive houses, which sometimes causes them to take new designs abroad. They attach great importance to the better education of the salesman.

E. METAL-WORK.

(1) Architectural Metal-work.

Source of Designs.—The original idea of the type of design is conceived by an architect, but the actual design often emanates from a designer, from a sculptor, or occasionally from the craftsman himself.

Present-day methods of manufacture do not differ materially from those practised formerly, and there is practically no machine work. At present there is much " period " work, because architects are designing period buildings. The best firms are capable of doing original designs in the style of past centuries without merely copying.

Some of the better firms would not enter for competitive tenders before the war, but the scarcity of special order work has since made it necessary. The best firms rely upon obtaining orders by quality of workmanship and design rather than by speed and cheapness.

The architect may give details showing the size and position of the proposed metal-work, or else he may give rough sketches, eighth scale or half-inch scale drawings. The metal-work firm has additional drawings prepared by its designers, which are submitted to the architect for approval. However complete the architect's drawings may be the working drawings are always made by the sub-contractor. No additional charge is made for the design, but of course its cost is included in the price.

Books and museums are used by the majority of firms to a great extent, both for literal reproductions and for the study of detail.

Designers.—In a firm producing first-class work it is essential that the director should be an artist and that he should supervise production.

Under the director there is generally a staff of designers and draughtsmen. It is of course found that a good draughtsman is not necessarily a good designer.

The firms state that the necessary qualifications of a designer are :—

(1) A thorough knowledge of all the technical processes of production and their cost.

(2) A good groundwork of artistic ability, a knowledge of the abstract principles of design and of all styles and periods.

(3) Ability to present a design upon paper attractively for submission to a client.

It is also an advantage if a designer can model.

It is not often that one man combines all these qualifications in equal degrees, and the drawing office is therefore organised so that each man specialises to a certain extent, though he must also be an all round man.

In the majority of firms, both the managing and the designing staffs have the technical knowledge required for instructing the craftsmen or the works manager, and in some cases the representatives who call on architects have had a certain amount of training as designers.

Directors of the best firms are unanimous in stating that, as there is a difficulty in obtaining suitable men, they usually train their own draughtsmen. Few schools teach founding and large architectural smiths' work.

Opinions are divided upon the value of supplementary art school training. Some directors encourage their boys to develop their general artistic power by drawing from life, and to give metal-work a rest in the evenings, whilst others say that it is good for students to do some manual labour in the evenings, e.g., founding candlesticks or forging hinges.

The making of measured drawings of good examples of old work in museums is of great value to a student in the early stages of his training, but later on he will probably derive more profit from looking at museum collections and existing specimens and thinking about them.

The great majority of men at present employed by metal-work firms have studied at schools in the evening.

In some cases designers employed after a two or three years' full-time course at an art school have been found unsatisfactory. It is stated that they have not enough commercial or practical knowledge to be of use, but that they nevertheless demand a higher salary than the ordinary beginner. Beginners are usually taken directly upon leaving school, mostly of the secondary or grammar school type, but sometimes they are factory boys or office boys who show a taste for drawing. A beginner's first work consists of tracing copies of other men's drawings. He is afterwards allowed to set out drawings to another man's instructions, or to finish off work that others have begun.

In the 11 firms visited, 62 designers and draughtsmen were employed. In four of the firms the director, or one of the directors, is an artist ; in the others there is a head designer in charge of the drawing office.

Beginners are employed at a salary of 8*s.* to 10*s.* a week. This rises gradually to £2 10*s.* or £3, after three, four or five years. If a draughtsman shows special ability, his salary may rise to £6 or £7 per week, or possibly more as a head designer. Some firms give regular increments upon a merit basis.

The draughtsmen and designers seem to be all British, though Frenchmen are sometimes employed as carvers or modellers.

No cases of designs being bought from " free lance " designers were met with.

Modellers.—Modelling and carving is done either by a designer or, more often, by men specially employed ; they may be required to do human figures or animals. Firms who do not employ a modeller capable of undertaking such work engage a sculptor to do the model for them.

Craftsmen.—There is danger of a serious shortage of skilled craftsmen in the future. Even though firms pay their boys a salary upon first entering the works, it is said to be hard to obtain them and practically no boys are being apprenticed.

In one old-established firm many of the craftsmen are stated to be the grandsons and great-grandsons of former craftsmen. In one firm there is no designing staff with the exception of one draughtsman who makes full-size details of architect's designs. Some reproductions are made, but the majority of designs are supplied by architects. The craftsmen can finish a piece of work better by themselves than if working to a full size drawing.

A certain amount of work is not done to architects' designs, e.g., facias, signboards, inscriptions, and fittings for churches and public buildings.

Registration of designs.—Many firms complain of plagiarism on the part of other firms. Registration is considered to be of no value, because a slight alteration will suffice to keep within the law. Even firms who specialise in reproductions frequently complain that other firms copy their copies.

Metal-work made for Stock.—The general conditions regarding designers are the same for door furniture and fire grates as for the rest of architectural metal-work, except that by far the greater number of designs are made for stock and not to the individual requirements of architects.

The most expensive fire grates are almost entirely adapted from actual examples in museums or private houses.

Occasionally a special order design is bought from the architect and becomes a stock design. In a firm supplying this type of work the manager has a thorough knowledge of " period " and selects " new " patterns, either from museums, books, or country houses. An outside draughtsman is employed to make measured drawings for the factory. The three draughtsmen employed in one such firm are concerned with the cheaper class of work only. There is a great field for artistic design in simple inexpensive fireplaces and grates, which does not seem to have been explored by many firms.

Electric light fittings are made both for architects and for stock. Factories are sometimes run in conjunction with a retail business. In one wholesale and retail firm the head designer is also a salesman in the London shop. At first he had to instruct both the designing and productive staff in every detail, but now that they have learnt his methods he can draft a design in London and send it up to Birmingham to be executed.

A designer must know something of electric lighting so that he may make proper allowance for wiring and bulbs.

(2) Silverware and Electro-plate.*

Design occupies the same position both in silverware and electro-plate and in pewter. The modern tendency is for large firms to produce in mass by machinery, with the consequence that small firms employing hand labour cannot compete commercially.

Methods of Production.—Machine production has caused a revolution in many of the methods of manufacture. The old method of making hollow-ware was to hammer it up by hand. The shape is now "spun," and the ornament, instead of being raised by hand from the body of the article, is stamped by a die and soldered on (dies have, however, been used for many years). Casting is used for ornament to some extent.

Sources and Tendencies of Design.—Modern methods have produced no corresponding changes in design. The work of the eighteenth and early nineteenth centuries can be reproduced by machinery and is the main source of influence, details being altered to meet requirements of cost or of machine production.

In table-ware the public taste is now more and more for plain work. Most manufacturers are of opinion that the public now demands a better type of design than formerly. Manufacturers and salesmen both try to increase sales by bringing out new patterns, but on the whole the traditional forms sell best.

New patterns for the table are brought out by most firms each year. In some firms more designs are made during a trade depression than during a boom, in the effort to create a market.

Each market has its own type of design ; a different design is sold in Bond Street from that sold in Edgware Road, and that sold in the Dominions and Colonies is different again.

Some of the most interesting designs are those which manufacturers regard as having no artistic value, e.g., hotel-ware. In order that this may be easily cleaned, no ornament is permissible, and in general the shapes are clean and efficient looking.

Trophies and other articles for presentation give great scope for design, but full advantage has not been taken of it. There are few historical motifs available for such work, and instead of developing the possibilities of modern design, makers have used all kinds of unsuitable material to provide inspiration, e.g., designs made for Wedgwood pottery, for stone or marble by Piranesi, copies of Greek and Roman bronzes, marbles and ceramic urns. Cups which are made to be sold from stock are usually fairly plain. This is said to be generally due to a desire to obtain as much bulk as possible for the money spent. There is another type of trophy which consists of a statuette of, e.g., a huntsman, golfer, footballer or soldier. The greatest possible pains are taken to ensure that the detail is correct, but there is little design or plastic feeling. "Ornaments" often take the form of small-scale reproductions of famous sculpture, which are usually modelled from casts in museums and art galleries.

France and other countries appear to have little influence upon design in silverwork, except that their historical styles are copied, though not to the same extent as the English.

Details may be obtained from various sources :—

1. In very old-established firms the work done, say, a hundred years ago is reproduced, the old sketch books and, in some cases, the old dies being still in existence.

2. Designers are sent to museums to make drawings which are afterwards adapted to modern needs.

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* Not including ecclesiastical and other silver work produced by artist-craftsmen.

3. Most designing offices have a library of books on silverwork and kindred subjects, and suggestions are drawn from these. The library also contains books of general information with photographs or illustrations likely to be useful in designing trophies for special purposes.

In general, museums and books are not used as material to work on for fresh designs, but to provide ready-made designs which are then adapted to commercial requirements. Owing to the high cost of making new dies or models a new design is often altered so that existing dies or models may be used.

Designers.—The eight firms visited employed 24 designers. Of these four were women and two were Frenchmen. Three of the women and both Frenchmen were also modellers. Among firms producing silverware in large quantities the proportion of designers to operatives varies from one in three hundred to one in sixty, according to the amount of special order work done.

The designer has not a very free hand. He is fettered by considerations of cost and also by the " average " taste of the public.

In a large firm the designing office works in close touch with the management and the costing office. Demands for designs are usually given to the head designer by the manager or head salesman with suggestions as to the style to be adopted. The designer then prepares a design or supervises its preparation in the form of either drawings or models, or both. In the case of a special order this design or model is shown to the customer for approval. In the case of a design for stock a specimen piece is first made, upon which the designer, manager, and factory manager confer and suggest amendments. The production of a new pattern needs a considerable outlay on tools, and is not put in hand without careful consideration.

The designer may not produce many finished designs a year, as a great deal of time is spent in considering and developing ideas for new sets.

None of the firms visited make a practice of buying designs from outside.

Modellers.—Roughly one-third of the designers in the firms visited were modellers, who did drawing as well as modelling. Figure or floral work or ornament may be chased or repoussé or may consist of applied castings which have first been modelled in wax. Sometimes the die sinker is a modeller. Student die-sinkers in the schools go through a course of modelling.

Qualifications of a Designer.—The qualifications considered necessary for a designer may be summed up as follows :—

(1) A thorough knowledge of technical processes.
(2) Familiarity with commercial conditions as regards price and public demand.
(3) Knowledge of historical styles.
(4) Good taste and fertility of ideas, together with ability to work out a rough suggestion.
(5) Skill and accuracy of draughtsmanship.
(6) Ability in modelling.

Remuneration.—Little information regarding salaries was available. The head designer in smaller firms appears to earn £5 to £8 per week, but in larger firms the salary is probably much higher. An assistant designer appears to earn up to £6 per week.

Training of Designers.—The majority of designers have been trained in the trade, and have supplemented that training by work at the art schools in drawing and design, practical silversmiths' work and modelling. From the manager's point of view trade experience in design is the most important. The business of the designer is less to create new designs than to put the requirements of the manager on paper for showing to clients and for workshop purposes.

Managers are sensible of the value of training in drawing and technical processes such as is provided by the L.C.C. Central School of Arts and Crafts and in the Birmingham School for Jewellers and Silversmiths. The designer has there an opportunity in the drawing office of actually making articles, and he thus gains a fuller knowledge of workmanship and familiarity with his materials.

Most managers find fault with the type of school designs, and consider that a more commercial type should be taught, together with a more thorough grounding in historical styles.

It is remarked by masters in the schools that a boy who is keen during the earlier stages of his training as a designer or craftsman tends to lose interest later owing to the specialisation of labour in a firm.

Men who have had only a general training in drawing and design at a non-technical art school are regarded as being of no value to the trade.

Registration of Designs.—Two or three of the higher-class firms register their designs, but find that, nevertheless, they are usually copied.

Design and Craftsmanship: (1) *Engraving.*—The craftsman appears to have little influence upon design. In the more expensive work engraved patterns are usually first drawn by a designer. In other cases the engraver is left to design a piece of ornament as he works, but such designs are very stereotyped. Engraving demands a high degree of manual skill.

A skilled craftsman works very quickly, three-quarters of an hour being the average time taken to engrave a complicated design on the lid of a cigarette case. The best trade engravers are engaged in heraldic inscriptions, monogram work, etc.

(2) *Engine Turning.*—A commoner form of skilled work is engine-turning. This is done by a machine capable of producing infinite varieties of surface treatment. These varieties are determined by the man who works the machine in collaboration with the designer or the factory manager.

(3) *Enamelling.*—Enamelling on metal-work, such as toilet sets, hair brushes and mirrors, and on small boxes and other fancy goods, is done by about half a dozen firms. In this process coats of vitreous enamel are applied to an engine-turned surface. No designer is employed for the greater part of this work except for the shapes, which are usually simple, as novel or complicated shapes do not sell readily. A certain amount of enamelled design is done for small fancy goods, but firms doing this class of work are, in general, too small to be able to afford a good artist.

(3) Jewellery Trade.*

The public of recent years has come to judge jewellery chiefly by the value of the stones employed. People are unwilling to pay large sums for design and workmanship which may go out of fashion. Elaborately worked settings have given place to arrangements of gems which do not show the setting. The introduction of platinum, which allows a much finer and lighter setting, has facilitated this. Simpler forms have been designed and design is free from the slavery of "periods."

On the other hand, there is said to be no demand for ornaments of finely wrought metal or for semi-precious stones, however beautiful. To a certain extent managers deplore this, as the gem market is so well known, whereas if jewellery were bought merely for beauty it might be possible to make a little extra profit on a fine design.

Position of Design in the Trade.—Although no firms have been met with where the director is an artist, directors consider design to be the most important branch of the business. The majority state that they consider public taste to have improved greatly during the last twenty years.

* Not including the jewellery produced by artist-craftsmen.

Designers.—The seven firms manufacturing high-grade jewellery which were visited all employed designers, the total being twelve, and the proportion of designers to operatives varying from 2½ per cent. to 10 per cent. Their salaries range from £5 to £15 or more per week for a head designer. In two of these firms the designer is in the position of manager, and is in touch with the retailer. The style of a new design is determined by a director, by himself, or from salesmen's suggestions. In one firm the designer is in touch with the factory, though he does not control it. In three of the others the designer works in a watertight compartment, a director or manager being responsible both for originating and for carrying out new designs. One manager complained that the designers did not have enough practical knowledge, but in other firms it was found that designers were able to make jewellery themselves.

Two of the designers were Frenchmen, and it was said that more French designers would be employed in England if it were easier to get them to come over. Four managers stated that they considered French designers better than English.

Foreign Craftsmen.—French and Italian craftsmen are employed in some London firms. The general opinion is that their work is lighter and more delicate, but not so strong and thorough as that of the English workman.

Craftsmen Designers.—Thirty years ago craftsmen in the jewellery trade could produce designs on their own initiative. Possibly the designs done to-day are better, but it is to be regretted that the older method of producing them has almost died out.

Personnel of Workshop.—There is nothing in the way of mass production in the jewellery trade, nor is labour divided to any great extent. The average firm employs about 25 persons. It is usual for one to make the mount, another to set the gem, and another to polish.

Sources of Design.—As in dress, fashions originate in Paris and far more jewellery is bought in Paris than in London. London fashion is stated to be about a year behind that of Paris.

A director of one firm visits Paris with his designer once a year to get fresh ideas. Others visit Paris and give their suggestions to the designers when they return.

There is a strong objection on the part of most managers to buying designs at the door, chiefly because there is no guarantee of exclusiveness. Many of the smaller manufacturing firms, however, have designs done to order by outside designers. It is usual for the manufacturer to ask for a number of alternatives "in the prevailing style," all such alternatives being paid for. As the stones are often lent to the designer, it is necessary for him to have established his position and to be well known to the manufacturers. Free-lance designing is rather a precarious livelihood, and the majority of well-paid designers agree that regular workshop employment is preferable. The two free-lance designers who were visited commenced in a jeweller's workshop, and both now pursue other forms of art in addition to jewellery design.

The price paid for designs varies from 10*s.* to £2.

Registration of Designs.—Occasionally designs are registered, but the practice is not general. Only one article is made to each design, and most firms try to compete with rather than to copy their rivals. There is a good deal of plagiarism on the part of firms working for the cheaper markets, but the clientèle is different and the designs have necessarily to be altered with a view to cheap production.

Modification of Designs.—Retailers sometimes supply designs to the manufacturers, but the latter usually prefer to be responsible for their own designs, in order that they may have a chance of doing better than other firms.

Experience in arranging stones of varying sizes and shapes is of great importance. The designer is given a certain number of stones and cannot use one more or less. A great deal of a designer's work consists of designing new mounts for stones the mounting of which is out of date.

The stones are sometimes set out on wax or the design is prepared by rough sketches and then drawn on celluloid or paper in order that it may be shown to prospective customers or used for catalogues. Sometimes a working drawing is made from this design by tracing, and sometimes the first design is given to the workman to use.

As pieces of expensive jewellery are not usually duplicated, and many alternatives are made for one set of stones before the design is finally settled on, the number of designs produced by a designer is very high, being as many as 200 per month.

The training of designers in England and France.—The majority of English designers have commenced in the workshop, and have been found to have special ability for drawing, which they have developed at evening classes. Others enter a designing office as beginners straight from school.

In France the training of a designer is more thorough and less haphazard. One French designer working for an English firm spent three years at a School of Art learning drawing, design, and the history of art. After short practical experience with a firm he studied for a further three years at a school of technology, where he learnt metallurgy, and the chemistry of gems, and was thoroughly grounded in all the technical processes of jewellery and metal-work.

Most managers complain that beginners do not study so seriously as formerly, and that workmen now require more supervision and take less interest in their work.

Schools for Jewellers.—On the other hand, greater facilities exist for the student workman to-day. The Birmingham School of Jewellers and Silver-smiths is a good example. This school does not exist to train men for a particular position in a firm, but to educate and show them the possibilities and interest of their work. The youngest students in the school attend two or three times a week while still at the elementary schools and learn the elements of design, always with reference to some kind of craftsmanship. Later, boys who enter the jewellery or silversmith's trade, design and make in the school concurrently with lectures, drawing and modelling. Both designers and craftsmen have the same curriculum.

A number of manufacturers who encourage their boys to study at the school give them full wages for two afternoons a week at the school and pay their fees, but find that the boys do not take advantage of such encouragement. This is largely ascribed to opposition on the part of the foreman, who does not want his work disorganised, and on the part of the men, who do not want the boys to know more than themselves. One manufacturer stated that owing to their school training his boys could make a piece of jewellery as well as the men, the only difference being in speed.

The L.C.C. Central School of Arts and Crafts includes a pre-apprenticeship school for silversmiths and jewellers and the students trained in this school are always absorbed in the trade.

The Cheaper Jewellery Trade.—The same general conditions as to the production of designs apply to the cheaper trade, except that owing to the production of a number of articles from each design, the designer is relatively a less important person. There is not enough work in a small factory to make it worth while to keep a well paid man on designing only. In some cases the designer is in the workshop and is paid slightly more than the workmen, and sometimes the foreman draws out new designs to the suggestion of the manager. On the other hand one of the managing staff may also be a designer. For instance, the manager of one firm employing 120 men does most of

his designing during the week-end or in the evening, all his day being spent in office work and workshop supervision. In such cases the designs are not nearly so accurately drawn or well presented as in the more expensive firms, being for the most part rough pen and ink sketches, the detail and finish being settled verbally between the manager and the workman. For cheap jewellery, such as tie pins, brooches, chains, studs, links, etc., no designers are employed. A trial piece is made in the factory to the suggestions of the manager. Often it has to be made up to fit stock patterns of artificial stones, celluloid inlay, chains, fastenings, dies, etc., and has to be adapted to the machines in the factory. Great ingenuity is necessary on the part of the director to arrange his machines and to divide the labour so as to obtain the maximum economy and efficiency, but design is chiefly a question of varying the material at hand. Such stamped designs as are used are all provided by the die-sinker to the trade, who is usually a small man working on his own account. The necessary designing or drawing consists for the most part of scroll or leaf work, animals' heads, etc. The die sinker has usually had some instruction at the school of art and has supplemented his own powers of drawing by reference to photographs or other drawings. Die sinking requires very expert workmanship, which may be learnt both in the workshop and at the school.

F.—PRINTING.

Printing as here considered comprises three main groups of industries which are conveniently indicated by the kind of printing surface employed:

(1) The typographic group, which makes use of a surface in relief, as type or process blocks.

(2) The lithographic group, in which a flat, or comparatively flat, surface is used.

(3) The copperplate group, where the pigment is deposited in sunken lines or channels, and spaces, often called "intaglio."

This third group is relatively unimportant as an industrial process, being slow and laborious, but gives a quality through the closer personal touch, e.g., in etching, aquatint, and photogravure. In the meantime a photo-mechanical development is rapidly bringing this group into wider industrial relations—the development known as rotary photogravure.

(1) Typographic or Letterpress Printing.

This is what most people think of when printing is mentioned without qualification, i.e., printing from type and blocks, or from stereotype plates or electrotypes, which are duplicates of type and blocks made by moulding, and then taking a cast in the case of stereotyping, and making a metallic deposit on the mould in the case of electrotyping.

This industry may be conveniently divided into four groups:—

(1) The printing of newspapers.
(2) The printing of advertisements.
(3) The printing of books.
(4) Jobbing work.

(1) In the newspaper group the setting of the type is now displaced by the use of the linotype machine, in which matrices are assembled and lines are cast as solid units. The printing face offers scope for choice amongst a number of designs. The displayed advertisements offer great scope for the trained designer in typography, but they can be conveniently considered with the general group of advertisement printing. The newspaper and magazine group is of very great importance to the communal life, but its problems are mainly those of organisation and mechanism.

(2) The printing of books. Books are largely printed by the use of the monotype machine, which has almost entirely ousted hand-set type for straightforward text. The monotype casts letter units similar to hand-set type, but already set in the order of the reading matter. Most book work is now done in the provinces where costs are lower than in London.

(3) The printing of advertisements is the main body of London printing in which the type is still hand set, and this is the group in which typographical design is most important and most urgently called for. The typographical design is usually called a "lay-out", and it may vary from a rough pencil indication of the arrangement, with notes on the faces and the sizes of types to be used, to a carefully drawn facsimile of the finished job.

Most displayed advertisements are, as noted, still set by hand; but already a machine is in use in London (the Ludlow machine) by which the display lines are cast. In using it, it is the matrices which are set by hand instead of the type. Its use will probably divide the compositor's work into that of designer and that of mechanical operator.

(4) Jobbing work. This is a very important section of the trade, both in London and all over the country. It is mainly "displayed" work (i.e., not straightforward setting in one type) and is difficult to organise for machine production. It is largely wanted on the spot, at short notice, and so offers the small printer, with a capital inadequate to the purchase of costly machinery, a chance to establish himself. Tradesmen's cards, bill heads, hand bills, local announcements, tickets, letter headings, and the like, form the bulk of his work.

Type.—The letterpress printing surface may be hand-set type, monotype letter units, or linotype slugs; or duplicates of these. But the linotype and monotype both leave this matter of type design an essential factor in fine work, as much so as when all type was hand set. The earliest types were copied from the manuscripts which had reached a highly developed perfection of form. The black letter types of Gutenberg and Fust and Schoeffer, and the roman types of Sweynheym and Pannartz and Jenson were of a standard that has not been surpassed. The developments that followed were mainly in the direction of smaller faces. The end of the 18th century saw the ugly modern design coming into general favour, but towards the middle years of the 19th century, the older form of letter, as cut by Caslon after the Dutch models, was re-introduced, and was followed by other versions of the older design. A new stimulus came into the printing world with the establishment of the Kelmscott Press in 1891, when Morris went back to the early German black letter and the early Venetian roman for new starting points. He was copied in a servile fashion by the trade typefounders, who introduced their new designs into the general trade for display setting. Other efforts were made, but nothing notable followed until the Doves Press cut another version of Jenson's roman, which was closer to the original than the Kelmscott Golden type had been. Then came the Ashendene and Eragny types, and it was fully realised what a variety of beauty was possible in typography, where all had been dull, or insipid, or ugly.

At this time another influence came in, itself owing its origin to the revived interest in the artistic crafts. This was the revival of calligraphy. This influence was immediately felt in German type design, and, considerably later, in America; but it only made itself felt in England through the type designs imported from Germany or America. Type founders in this country paid, and still pay, little or no attention to the revival of calligraphy, or they could easily lead the world in type design.

It is strange that the great printing houses have made little or no movement to acquire proprietary designs for their work, in view of the distinctive quality it would give them, and in view of the example of the private presses.

The Private Presses.—Private Presses are distinguished from the general printing trade by being almost exclusively occupied in book printing and from the generality of book printers by printing works selected by the proprietor or director of the press. They differ from ordinary publishers in the intimate control exercised over the production of their books, and in the very personal taste which serves as a principle of selection. The most notable private presses are :—

(1) The Kelmscott Press, founded by William Morris. The works of this press show decorated typography at its highest.

(2) The Doves Press. The special problem of the Doves Press was to raise pure typography to its highest power and to print the great English classics in monumental form.

(3) The Ashendene Press seems to stand between (1) and (2). Less austere than the Doves Press in type face and in the use of illustration it does not attempt to rival the rich borders and decorated initials of the Kelmscott Press.

(4) The Eragny Press. Here a further problem was dealt with, namely, the coloured illustration. The work of this press has set a standard for all future attempts at coloured illustration in relation to typography.

It is fortunate that the above-named presses dealt with such definite problems, and so left the ground clear for their successors.

Trade Schools.—Largely owing to the influence of Mr. Emery Walker, Mr. Cobden-Sanderson and Professor Lethaby, the London County Council instituted printing classes at the Central School of Arts and Crafts, whose aim was to be not merely technical efficiency, but to embody the lessons to be drawn from the research and experience of the private presses, and the revival of calligraphy, and so to set new standards of typography. This intention was fully realised, and in a few years the school made a new experiment by the institution of a Day Technical School of Book Production. This, too, has been very successful, and certain firms take the majority of their apprentices from this school, or send the lads they propose to accept as apprentices to this school for a preliminary training.

The London School of Printing deals with the masses of young printers, and under such conditions little can be effectively aimed at beyond technical efficiency. Here printing is isolated, unlike the Central School where many artists and craftsmen set standards that are a stimulus to their colleagues, and where criticism comes from many angles.

The General Trade.—After the private presses, to whom is due so much research work, it may be well to notice certain high-class firms, whose work shows a similar element of research and interest in new standards, while they main activities are in the service of commercial printing. These firms associate artists with their work, and one of them has exclusive right to use two distinct type faces.

In the general trade the problem that demands and receives most attention is that of organisation. It follows, then, that this report, which deals with the artistic aspects of printing, will not be concerned at great length with this aspect of the industry. But it is satisfactory to note that there is a very great improvement in London printing. The advertisements and jobbing work show the influence of the new standards of type design and arrangement.

The bad artistic influences come from the mechanical side. The texture of paper is sacrificed to the half-tone block and the use of rotary photogravure in the illustrated weeklies, while the two qualities of impression, relief and intaglio, destroy the unity of the magazines.

Illustration and Decoration.—The chief development in relief printed illustration has been the increasing appreciation of the woodcut.

In decoration there is little to record, but this is by no means to be deplored; for decoration has usually meant insipidity or actual disfigurement of the printed book. Morris stands alone as a book decorator of genius, and floriated initials and borders are best confined to the uses of advertising and display matter.

Display Work forms the bulk of the hand-set work in London. By this term is designated typographical matter where the relative importance of the various items is shown by the size of the type in which they are set, and by the relief given to the important items by means of whiting. This gives great scope to the powers of design of the typographer, for, while he gives prominence to the items, he must preserve the unity of the whole. The need has called for the specially trained designer or lay-out man, and this demand has been reinforced by the introduction into this country of the Ludlow machine already referred to.

The lay-out man is also a prime need of the advertising office, both to control the printer's setting of the advertisement and to present an attractive design to the prospective advertiser.

To sum up, artistic design is needed in typography in designing new type faces, in book production, and in lay-out work for display advertisements and jobs.

(2) Lithographic Printing.

Lithographic printing may here be considered in two main groupings :—

(1) The commercial work.
(2) The artistic lithograph.

This grouping is not sharply defined, for happily many examples of the second group are now to be met with in commercial work. What is more, the real progress has come from an impulse given by the second group.

This became effective with the foundation of the Senefelder Club, which holds annual exhibitions of artistic lithographs, and exists to develop the lithograph as an art form.

The main development of recent years has been that of the offset process. By this process the print is made not from the lithographic plate on to the paper direct, but on to a rubber blanket, and from this rubber blanket on to the paper. The advantage of this indirect printing is that paper of a much more decided grain can be used without any loss of detail in fine work, even in half-tone or three-colour. Further, the rotary principle of printing can be used with a very great gain in output on that of the ordinary lithographic machine.

For this process type matter often has to be photographed and reversed. This has given a new impulse to invention which in turn is likely to have a very great effect on letter design and display lay-out; and the demand for men who have had a training to fit them for these two branches will be greatly increased. At present, an adequate training for this work can only be obtained in the classes held at the Central School of Arts and Crafts in typographic design and in lettering.

Collotype printing belongs to the lithographic group. Its value is scientific rather than artistic, as it is purely a reproductive process. Colour collotype offers the most satisfactory reproductions of paintings and drawings for the purposes of students; but here the printer needs a strict training and discipline in the perception and use of colour; a lack of these has proved disastrous to the artistic pretensions of three-colour work.

(3) The Copperplate Printing Group.

Our third class offers comparatively little matter for a report framed from the point of view of industrial art. Etching is growing enormously in popularity, but no new technical development has followed on this demand.

Only from the photo-mechanical side is there a development of the intaglio processes. On this side we have a large increase in photographic illustration by means of rotary photogravure, usually in monochrome, but occasionally in colours. The results are mostly disappointing, for the claims of quality usually fail before those of speed and economy of production. Artistically, it may offer some advance on the half-tone illustration, because of its greater range of tonality. So far it has not realised this advantage, except with outweighing loss of quality. Only in colour has it the advantage over the half-tone three-colour process.

This report is concerned with printing as an industry in the group which employs design, and hence mechanical and chemical developments have not fallen directly within its scope. The permanence of ink pigments and the quality of paper are the two main factors on this side which affect considerations of artistic design.

CHAPTER VI.

STATE MEASURES FOR MEETING POST-WAR DIFFICULTIES OF INDUSTRY.

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STATE MEASURES FOR MEETING POST-WAR DIFFICULTIES OF INDUSTRY.

Introductory.

The title of this chapter obviously covers a very wide range of subjects, and, in order to reduce it to practicable limits, attention will be confined mainly to those forms of State action which have specially characterised the post-war period. Any attempt to deal more comprehensively with State measures affecting industry and trade would be impracticable in the space available. For example, one class of measures which would have to be included in any complete review are those relating to financial policy and taxation. It would, however, lead too far to embark on a discussion of such matters as the return to the gold standard or the embargo on foreign loans ; while questions of taxation are under consideration by Lord Colwyn's Committee on National Debt and Taxation. Another class of measures are those affecting the machinery of government in relation to commerce and industry. In this sphere important changes have been made since 1913, including the establishment of the Ministry of Labour and the Department of Scientific and Industrial Research* in 1916, the formation of the Department of Overseas Trade in 1917, the re-organisation of the Board of Trade in 1918 (when a special department for dealing with industries and manufactures was created), the establishment of the Ministry of Transport in 1919, the creation of the Electricity Commission in 1920, the setting-up of the Mines Department under the Board of Trade in the same year, and the re-organisation of the Imperial Institute (including the amalgamation with it of the Imperial Mineral Resources Bureau) in 1925. Another recent measure affecting the machinery of government was the establishment of the Committee of Civil Research in June, 1925, (see Cmd. 2440). This body, which is a standing Committee reporting to the Cabinet, is of an advisory character and has no administrative or executive functions. It is charged with the duty " of giving connected forethought from a central standpoint to the development of economic, scientific and statistical research in relation to civil policy and administration." The President of the Committee is the Prime Minister, and the regular chairman in the Prime Minister's absence is a Minister nominated by him for the purpose. The membership may include outside economic, scientific and statistical experts summoned for consideration of particular business as well as Ministers and their advisers.†

* Chapter IV contains information as to the work of the Department of Scientific and Industrial Research, including the scheme which it administers for State grants to Industrial Research Associations.

† See also page 409.

The measures which it is proposed to discuss in some detail in this chapter are those falling under the following headings :—

Assistance of a financial character, including the Trade Facilities Acts and Export Credit Schemes ;

Customs duties, including Imperial Preference ;

Import prohibitions, and particularly the Dyestuffs (Import Regulation) Act ;

Marking of imported goods ; and treatment of foreign enterprises and individuals as regards participation in industry

The sections dealing with the above subjects are in all cases based on material supplied by the various Government Departments concerned, i.e., the Treasury, Board of Trade, Department of Overseas Trade, Board of Customs and Excise, Home Office, Ministry of Labour, etc.

In connection with the references in various sections to recommendations by Committees on some of the subjects dealt with, it may be mentioned that a series of committees were appointed by the Board of Trade early in 1916 to consider the position of various important industries after the war with special reference to international competition and to report what measures, if any, were necessary or desirable in order to safeguard that position. The industries thus dealt with (and the reference numbers of the reports dealing with them) were coal (Cmd. 9093), iron and steel (Cmd. 9071), engineering (Cmd. 9073), electrical trades (Cmd. 9072), textile trades (Cmd. 9070), shipping and ship-building industries (Cmd. 9092), and non-ferrous metals (report not published). In July 1916 the Prime Minister also appointed a committee under the chairmanship of the late Lord Balfour of Burleigh to consider the commercial and industrial policy to be adopted after the war. This committee took into consideration the reports of the other committees on individual industries mentioned above, and it presented its report in December 1917 (published 1918, Cmd. 9035).

It would be interesting, if it were possible, to include in the chapter some particulars as to the extent to which other countries have adopted measures similar to those described here ; but the available information for this purpose is not complete. The Committee's " Survey of Overseas Markets," published in 1925, contained a chapter relating to Dominions and foreign customs tariffs and information as to foreign import prohibitions ; but these subjects were discussed from the point of view of British export trade and not in reference to the effects of the tariffs and prohibitions on the industries of the countries concerned. As regards financial measures, it is known that export credit schemes, some of them similar to the schemes in operation in this country, have been adopted in certain European countries, e.g. Belgium, Denmark, Germany, Netherlands. The German arrangements include a special scheme adopted in February, 1926, for assisting export of goods to Russia. No

complete information is available either as to direct bounties or subsidies to industry in other countries, or as to measures similar to the Trade Facilities Acts of this country. The "Survey of Overseas Markets" contained some information on the subject, including particularly (1) a summary of a Spanish Royal Decree of April, 1924, which made extensive provision for financial and other assistance to industry and export trade, and (2) a summary of the available information as to Government subsidies to shipping and shipbuilding in a number of foreign countries; but the introduction to that volume pointed out that the widespread impoverishment and financial weakness following the war, and the imperative need of public economy in order to restore exchange stability had effectively deterred most Governments from embarking on large schemes of direct subsidy.

In connection with measures for encouraging export trade through subsidies and bounties, it is of interest to observe that legislation has been enacted in a number of countries with a view to counteracting the effects of bounties or subsidies in this direction. Thus it will be seen from Annex E, page 449, that the Safeguarding of Industries procedure now in force in this country specifically mentions "subsidies, bounties, or other artificial advantages" as one of the factors which may give rise to an application for the imposition of a safeguarding duty; and some information about legislation in force in other countries is given in Annex A, p. 427.

Measures of a Financial Character.

These measures will be discussed under the following headings :—

(1) Financial Subsidies or Grants.
(2) Trade Facilities Acts.
(3) Export Credits Schemes.
(4) Unemployment Grants Schemes.
(5) Preference in Public Contracts.

(1) FINANCIAL SUBSIDIES OR GRANTS.

The promotion of manufacturing industry by means of direct financial subsidies is no part of the policy of this country. In the few cases where assistance has temporarily been given to industry some exceptional circumstance was present. Apart from the payment to the Cunard Steamship Company mentioned below, and the financial assistance granted towards the construction of houses for the working classes, the subsidies given in 1924–25 were in respect of light horse breeding (£28,120), motor transport for the War Office (£7,152), civil aviation (£138,511), and sugar beet (£492,040).* The special character of these is obvious.

As mentioned in a later section dealing with Imperial Preference (see page 414), the Government undertook in 1925 to make a yearly grant to be applied to schemes for furthering the marketing of Empire products in this country.† For the purpose of assisting the

* In 1925-6 increased sums were paid under these headings, and there was also a grant of £25,000 in aid of the British Industries Fair advertisement campaign.

† See Annex B for information as to other action initiated in 1925 with a view to inculcating on the public the practice of buying British goods.

Secretary of State for Dominion Affairs in the administration of this grant, the Empire Marketing Board was set up in May, 1926, and the sum of £500,000 was granted for the year 1926–27. The scope of the Marketing Board includes the agricultural produce of the United Kingdom as well as the products of overseas parts of the Empire. Its functions comprise (1) publicity and education; (2) the promotion of scientific research and economic investigation, and (3) particular schemes for the improvement of production and marketing. Under the second head it has made a grant, in conjunction with British cotton interests, to the Imperial College of Tropical Agriculture at Trinidad for the promotion of tropical agricultural research in general. The scope of the Board, however, does not extend to manufactured products, and its operations do not directly affect manufacturing industry.

It is, of course, true that a large sum of money was expended as a subsidy to the coal mining industry during the financial year 1925–26, but this, like the Coal Subvention of 1921–22, was a purely temporary measure. The following quotation from the report of the Royal Commission on the Coal Industry (1925) indicates the attitude of the Commission towards subsidies to industry.

> "If in any industry there is a labour dispute on wages, and a gap exists between the amounts that the employers are willing to pay and the amounts that the workers are willing to accept, or if demand declines and over-supply leads to low prices and production at a loss, it is wrong that the gap should be filled or the loss made good by recourse to the National Exchequer. It is indefensible that the people engaged in other industries should be taxed in order to provide profits for the employers or to maintain the wages of the workers, in the particular industry affected—their own profits, and their own wages, being often no better, and sometimes worse. . . . If recourse is had to this means in one crisis in one trade—unless it is definitely ruled now to be inadmissible as a policy—there will inevitably be pressure to resort to it in another crisis or in another trade. The result would be destructive to the national finances." (page 223).

It is sometimes stated that considerable amounts are expended by the Government in subsidies to shipping, but with one or two exceptions, Government payments to shipping companies are not subsidies, but are for postal services rendered by the companies. Tenders are invited for all new contracts, and the payments are based on the most suitable offer received. Of the exceptions, one (an annual payment—£14,728 in 1925–26—to steamers serving the Hebrides) is also in fact payment for services rendered, the object of the expenditure being to improve the conditions of life of the population in poor and remote districts. The other exception (an annual payment of £90,000 to the Cunard Company) is for naval purposes

as it arises out of an Admiralty contract of 1903 (which expires in 1927) for the maintenance by the company of a ship of approved speed, and conferring on the Admiralty rights of pre-emption or hire of all the company's ships.*

The principal case in which a subsidy has been granted since the war directly for the promotion of manufacturing industry is that of dyestuffs. The subsidy scheme came to an end in 1922. Financial assistance has also been given for the encouragement of flax-growing in the interests of the linen industry, and for promoting the development of cotton-growing in the British Empire. These three cases are described below.

It may also be mentioned that certain arrangements were made by H.M. Government, during the War, with the Australian producers of zinc concentrates for the purchase of supplies of this material over a term of years ending in June, 1930. These arrangements, and the contracts which have subsequently been made for the disposal of the material, have probably affected the price at which British smelters obtain their supplies of zinc concentrates.

Dyes.

A later section of this chapter (see page 416) contains information as to the special circumstances which led the Government to take measures, from an early date in the war, with a view to promoting the development of the dyestuffs manufacturing industry in this country. It will there be seen that a Committee appointed by the Board of Trade in 1916 to consider the position of the textile trades after the war recommended that financial assistance should be given to the dye manufacturers either by way of subsidy or by way of loan. This recommendation was carried into effect in 1918 when Parliament voted the sum of £2,000,000 "for the development of the dye industry by means of financial assistance in aid of developments, extensions and research." The scheme adopted will be found explained in a memorandum by the Board of Trade published in 1918 [Cd. 9194]. It provided that grants in aid of buildings and plant might be given up to a limit of 40 per cent. of the cost, and grants in aid of research up to 40 per cent. of the cost of extensions of laboratory buildings or equipment, and 40 per cent. of the annual cost of maintenance for periods determined by the Board of Trade.

* Arrangements were in existence before the war for the payment of subsidies to shipping companies trading with the West Indies (1) for providing special accommodation for the carriage of fruit and other products of Jamaica to the United Kingdom, (2) for the improvement of steamer communication between Canada and the West Indies, and (3) for a regular service of mail steamers among various West Indian Colonies. The first two came to an end in 1911, and the third in 1915. The maximum annual amount paid by H.M. Government under these arrangements was £48,000 in 1910–11, and the average annual payment from 1900 to 1915 was about £28,000.

The payments made under the scheme were as follows :—

	£
Loans	91,250
Grants in aid of the cost of plant and buildings ..	214,500
Grants in aid of research towards the cost of laboratory buildings and equipment	115,260
Grants in aid of research towards the annual cost of the maintenance of such laboratories ..	14,500
	£435,510

It will be seen that the total amount expended did not nearly reach the sum voted, and the scheme was brought to an end in 1922, subject to certain small payments in subsequent years in respect of commitments previously entered into.

Flax.

A great part of the supplies of flax required by the linen industry were derived before the war from Russia and Belgium, and when these supplies were cut off after the outbreak of war considerable difficulties arose, as many of the products of the industry were urgently required for war purposes. Strenuous efforts were, therefore, made to increase the supplies of flax from Northern Ireland (where it was already produced on a considerable scale) and to promote flax-growing in certain parts of England. During the war, financial and other measures for securing these objects were taken by the Flax Control Board established by the War Office.

In April, 1919, the Flax Control Board was transferred to the Board of Trade, and as a result of certain commitments already made and others entered into with the Flax Society, Limited, to meet part of any loss incurred by the Society, payments totalling about £270,000 had to be made by the Government. In April, 1922, the Flax Society, Limited, went into voluntary liquidation. There was also a similar Government guarantee in respect of flax-growing in the south of Ireland by the Munster Flax Development Company, Limited, to the formation of which the Government subscribed £33,000 secured by debentures. The company went into voluntary liquidation in December, 1925, and of the amount subscribed only £1,375 was recovered.

The Committee on Flax Seed and Flax Growing in the United Kingdom recommended in November, 1924, that the development of new strains of pedigree seed was essential to the commercial growth of the flax industry in the United Kingdom and that the work in this direction hitherto carried on by the Linen Industry Research Association should be continued by a body to be specially formed for the purpose. The Committee also recommended that such a body should acquire two existing factories in Somerset, and that a sum of about £40,000 should be made available (by way of

loan) during the ensuing two years to purchase the factory and stocks and provide working capital. H.M. Government and the Government of Northern Ireland agreed to provide this money, and the Flax Industry Development Society, Limited, was formed in May, 1925, for the purpose of developing new strains of flax seed and improved methods of fibre production on a factory scale. The amount provided by H.M. Government during the year 1925-6 was £19,740, partly for the purchase, etc., of factories to be leased to the Society, and partly as advances for working capital.

Cotton.

On July 25th, 1917, the President of the Board of Trade appointed a Committee "to investigate the best means of developing the growing of cotton within the Empire and to advise the Government as to the necessary measures to be taken for this purpose." The Committee's report (Cmd. 523) was published in January, 1920. One of their main recommendations was that the Committee should be continued in being and that funds for the promotion of cotton growing within the Empire should be provided from the following sources :—

(*a*) The British Treasury.

(*b*) Local revenues of cotton-growing areas.

(*c*) The cotton industry.

H.M. Government adopted the report and allocated the sum of £50,000 in five equal annual instalments, £10,000 being paid in 1920–21. Steps were taken to secure support from the cotton industry in the form of a voluntary levy of 6*d*. per bale of 500 lb. on all cotton used in the United Kingdom, and after 90 per cent. of the trade had agreed to the proposal the levy was made compulsory for a period of five years through the passing of the Cotton Industry Act, 1923. The receipts from the levy in the year 1925–6 were about £95,000. Arrangements were also made to establish a permanent organisation for the promotion of cotton growing, and a Royal Charter of Incorporation was granted on November 1st, 1921, setting up the Empire Cotton Growing Corporation. Meantime, a large sum of money had become available as the result of the measures taken by the British and Egyptian Governments during and after the war in connection with the marketing of Egyptian cotton. The British Government decided in 1921 to devote one-half of their share to the fostering of cotton growing within the British Empire, and the sum of £978,715 was, therefore, granted to the Cotton Growing Corporation, the payments under the previous arrangement being discontinued. The terms of the grant provide that repayment of the sum granted may be claimed in certain contingencies such as the discontinuance of the levy on cotton described above.

(2) THE TRADE FACILITIES ACTS, 1921–1926.

The Trade Facilities Scheme dates from the autumn of 1921. The Trade Facilities Acts empower the Treasury to guarantee the payment of the interest or principal (or both) of a loan if, after consultation with an Advisory Committee appointed for the purpose, they are satisfied that the proceeds of the loan are to be applied towards or in connexion with the carrying out of any capital undertaking, and that the application of the loan is calculated to promote employment in the United Kingdom. The purpose of the scheme is to relieve unemployment by encouraging the placing of immediate orders for capital works through the offer of a Treasury guarantee for the loans raised to finance the works; the guarantee operates to reduce the loan charges on the money so raised. The loans are in practice made by the Insurance Companies or Banks, or occasionally by the National Debt Commissioners, or, if the amount requires it, they are raised by public issues. It should also be noted that, subject to the statutory conditions being met, it is immaterial whether the applicants are a government, a municipality, or a company, or whether they are in the United Kingdom, in the Empire or in a foreign country. Guarantees have in fact been given covering expenditure in this country by foreign companies and municipalities, as well as by similar bodies within the Empire.

Applications for guarantees are made direct to the Advisory Committee, which is a small committee of experts. The enquiries of the Committee are directed to ensure, *inter alia*, that (*a*) the proposed loan is in respect of capital expenditure and that the expenditure will relieve unemployment; (*b*) that there is evidence that the scheme could not reasonably be financed without the Treasury guarantee, or alternatively, that without it there would be considerable delay in putting the scheme into operation; (*c*) that the security offered is adequate and provides reasonable protection to the taxpayer. The ordinary contract under the scheme provides that, except with the written consent of the Treasury, all the plant, machinery and materials, required in connexion with the work to be undertaken, shall be purchased in Great Britain at the lowest prices under contracts requiring the contractor to certify on his own behalf and on behalf of the sub-contractors that the plant, machinery or materials supplied are wholly of British manufacture.

The original Trade Facilities Act, passed in November, 1921, provided for guarantees not exceeding a maximum of £25 million; it expired after one year. By subsequent Acts the period in which guarantees may be given has been extended to the 31st March, 1927, and the maximum raised to £75 million, of which £65 million had been granted down to the 30th June, 1926.* In the course of his Budget speech in 1926, the Chancellor of the Exchequer stated: "It is not our intention to renew the Trade Facilities Act next year. We have reached the conclusion that that process has exhausted its usefulness." (Hansard, Vol. 194, col. 53, 26th April, 1926.)

* The total to 31st December, 1926, was nearly £71 million.

A statement is presented to Parliament and published quarterly of the guarantees given.

The following table shows the amounts of the guarantees given under various headings up to 30th June, 1926. Further details will be found in Annex C, Table I, pp. 431–5.

	£
Public Utility Undertakings—	
Domestic	18,027,100
Empire	5,690,000
Foreign	3,720,000
Total, public utilities	27,437,100
Industrial—	
Domestic	13,855,095
Empire	2,630,000
Foreign	1,615,000
Total, industrial	18,100,095
Shipping—	
Domestic	17,319,419
Foreign	2,076,666
Total, shipping	19,396,085
Total—All undertakings	64,933,280
Total, Domestic	49,201,614
Total, Empire	8,320,000
Total, Foreign	7,411,666
Total, all undertakings	64,933,280

The greater part of the benefit of the guarantees has been felt by the iron and steel, the engineering and shipbuilding, the building, and the electrical industries. Losses up to the present have been comparatively small, the Treasury having had to implement its guarantee in three cases only. The actual payments involved up to 30th June, 1926, were £27,392. It would be unsafe, however, to assume that there will be no further losses, since expenditure is not complete in the case of some undertakings and in others the new works have been in operation only for a short time.

Figures are supplied by each company or municipality showing the number of men who are employed as a result of the guarantees. These figures are, of course, inexact, since it is quite impossible as regards any large scheme to give the total number of men employed. It is easy to say, for example, in the construction of a railway how many men are actually employed on building the embankments and it is also fairly easy to get figures from the manufacturers of steel rails, but the further back one goes the more difficult it becomes; for example, it is obviously out of the question to get figures showing

the number of men who are employed in winning the coal which is used to smelt the ore which goes to make the iron which goes to make the steel for the rails. The employment figures for works still in progress, however, such as they are, show a total employment of about 46,000, and this figure would take no account of the number of men who are permanently employed in the running of the new factories or working on the new railways.

Section 2 of the Trade Facilities Act, 1924, provides that the Treasury may make a grant towards interest on loans raised in the United Kingdom under certain conditions by a Government, local authority or public utility undertaking in the Empire. The grant must not exceed three quarters of the interest payable in the first five years in respect of such portion of the loan as is to be expended in the United Kingdom, and the Treasury must be satisfied (1) that the proceeds of the loan are to be applied by way of capital expenditure on or in connexion with a public utility undertaking in the Empire in accordance with a scheme approved by the Government concerned ; (2) that the expenditure is in anticipation of expenditure which would normally have been incurred at a later date ; (3) that the application of the proceeds of the loan in the manner proposed is calculated to promote employment in the United Kingdom.

Applications under this Section are dealt with by a second committee. Up to 30th June, 1926, three applications had been approved for grants of interest (see Annex C, Table II, page 435). This section of the Act expires on 15th May, 1927.

(3) EXPORT CREDITS SCHEMES.

In order to assist in promoting employment in this country, and originally with a concomitant object of helping in the economic restoration of certain States in Central and South Eastern Europe, State schemes for export credits were initiated in 1919, and the Overseas Trade (Credits and Insurance) Act, 1920, was passed to provide the required Statutory Authority. Under the first scheme the Board of Trade could make advances, up to an amount outstanding at any time of £26,000,000, in respect of goods wholly or partly produced or manufactured in the United Kingdom exported to the countries referred to. This scheme, not having been much used, was amended in 1921 : instead of making advances it was decided to adopt the method of guaranteeing bills drawn by traders in respect of exports to the countries (now including the British Empire) covered by the scheme. Later in 1921 the scheme was further widened to cover all countries, except for the time being British India, Ceylon, the Straits Settlements and the Far East (where there were large unabsorbed stocks), and Russia ; and in 1925 it was opened to all these countries, except Russia, in respect of machinery and similar goods for which long-term credits may be required.

The authority for these schemes was derived from successive Acts of Parliament, the latest of which (1924) provided that the period in which new credits could be granted should terminate in September, 1926. Before this date arrived, however, a new scheme had been adopted by the Government on the recommendation of the Credit Insurance Committee, which had been appointed "to examine and report upon the extent to which benefit may be likely to accrue to export trade from insurance against the risk of bad debts; to consider whether it is necessary in this connection for the State to take any action towards supplementing existing facilities; and, if the Committee think it desirable, to frame a scheme" The Committee came unanimously to the following conclusions (Cmd. 2619):—

(*a*) that a demand exists for the insurance of credits for export trade which is not unsound in character;

(*b*) that the existing facilities are not adequate to meet this demand; and

(*c*) that their extension would be beneficial to the export trade of this country, provided that due caution is exercised to avoid encouraging unsound business.

The Committee emphasised their view that it would be advantageous if some additional facilities could be provided for those export trades which need to give credit up to four or five years. They advised that the Export Credits Scheme, in an improved form, should be extended for a further limited period.

Further statutory authority was not required for the new guarantee scheme, except that it was necessary to extend the periods within which guarantees could be granted, and up to which they might remain in force. Under the Trade Facilities Act, 1926, these periods have been extended to September, 1929, and September, 1933, respectively. The Export Credits Guarantee Department guarantees the payment at maturity of sterling bills of exchange drawn on buyers overseas in connection with the export from this country of goods wholly or partly produced or manufactured in the United Kingdom, including coal. Munitions of war, goods already shipped (except, in certain cases, goods shipped on consignment from stocks), and certain transactions on open account are excluded. Applications, which are made through a bank, are considered for long-term as well as short-term credits. Exporters may obtain:—

(1) facilities of an insurance character by which the guarantee is given without recourse to the exporter. In these cases the guarantee will not exceed 75 per cent. of the amount of credit granted to the importer;

(2) facilities of a financial character by which the guarantee is given with full recourse to the exporter. In these cases the guarantee may be for the full amount of the credit granted to the importer ;

(3) facilities of an intermediate character by which the guarantee is given for the whole or part of the credit, either without recourse to the exporter, or with such recourse as may be agreed. In these cases the exporter will not be relieved of more than 75 per cent. of the risk on the bill unless approved security is provided.

These facilities are available in respect of specific transactions, but sometimes the Department gives guarantees up to a fixed amount for transactions with a number of importers in a particular country or countries. General guarantees are intended only for cases where the credit granted does not exceed six months. Approved banks, bankers, credit associations or companies providing credit insurance may also secure the Department's guarantee against loss on specific transactions.

Applications for guarantees are submitted to an Advisory Committee. The Department charges a premium, varying according to the circumstances, for the granting of its guarantee.

Business done.—Under the old Advances Scheme, advances were made amounting to £1,752,150. Under the old Guarantee Scheme, between 1921 and 30th June, 1926, 2,806 sanctions for guarantees to the value of £29,814,724 were given. The guarantees actually used by exporters amounted only to £6,140,852, the number of new bills guaranteed being 8,899. In consequence of renewals the Department guaranteed in all bills to the amount of £19,261,875. The discrepancy between the sanctions given and the amount actually used is largely due to the following circumstances :—

(*a*) Applicants armed themselves with the Department's guarantee when tendering for an order, and ultimately the finance was obtained elsewhere or the tender was unsuccessful.

(*b*) In many cases competitors tendering for the same contract each made application to the Department.

The guarantees made use of were chiefly in respect of exports to Argentina, Australia, Belgium, Brazil, Canada, Esthonia, France, Germany, Holland, Italy, Japan, Yugoslavia, New Zealand, Peru, Poland, Portugal and Colonies, and the Baltic States.

It may be added that some serious losses occurred under the old Advances System, but as regards the Guarantee Scheme the Credit Insurance Committee reported that there did not appear to have been either material profit or loss.

The following table covering the period to 30th June, 1926, shows the commodities in respect of which guarantees have been given, with the amount of guarantees in each class :—

	£
Coal	676,631
Coke and manufactured fuel	6,962
Iron and steel and manufactures thereof	1,065,876
Non-ferrous metalliferous ores and scrap	7,313
Non-ferrous metals and manufactures thereof	108,555
Cutlery, hardware, instruments, implements	155,733
Machinery	1,439,959
Vehicles (locomotives, ships, aircraft)	1,143,578
Electrical goods and apparatus	91,657
Cotton yarn and manufactures	881,365
Raw cotton waste	5,044
Woollen yarns, manufactured	113,423
Silk and silk manufactures	9,494
Manufactures of other textile materials	49,115
Apparel	79,621
Chemicals, drugs, dyes and colours	10,073
Leather and manufactures thereof	29,748
Paper and cardboard	11,067
Earthenware, glass, abrasives, etc.	13,021
Rubber manufactures	135,683
Food and drink—non-dutiable	31,499
Flour	12,866
Unclassified	62,569
Total	£6,140,852

(4) Unemployment Grants Schemes.*

The Unemployment Grants Committee was established in December, 1920, for the purpose of allocating funds placed at its disposal by Parliament for assisting local authorities in carrying out approved schemes for the relief of unemployment. According to their Fifth (Interim) Report, issued in July, 1926, the Committee had, up to the 24th June, 1926, approved for State assistance to the extent of, approximately, £40,000,000, over 11,900 schemes, amounting to more than £104,000,000 in value. The Report estimates the amount of direct employment provided as a result of these schemes to be nearly 4,000,000 man-months, and states that, in addition, at least as much employment again has resulted from the preparation of materials in factories, workshops, quarries, etc. The following

* See also paragraph headed "Contracts by Local Authorities" on page 397.

tables show the classes of work covered by the schemes which were approved for grant by the Committee from the beginning of their operations up to 24th June, 1926.

Loan Schemes.—For these schemes grants are made of a percentage (varying according as the schemes are revenue-producing or not) of the interest, or of the interest and sinking fund charges, on loans raised by local authorities for approved works.

	Amount of loans for which grants were approved.
	£
Non-revenue-producing :—	
Roads and footpaths	21,608,876
Sewers and sewage disposal	15,306,201
Parks and recreation grounds	3,150,334
Water (Scottish)	2,782,590
Public institutions	1,235,805
Sea defence	858,226
Sanitation	271,290
Miscellaneous	442,765
Total, non-revenue-producing	45,656,087
Revenue-producing :—	
Docks	9,920,790
Electricity undertakings	7,069,627
Water undertakings	5,240,628
Tramways	3,732,648
Gas	2,048,379
Tennis courts, bowling-greens, etc.	889,502
Land development	500,932
Cemeteries	314,024
Conveniences	174,247
Miscellaneous	520,939
Total, revenue-producing	30,411,716

The total amount of the loans approved for grant by the Committee up to June, 1926, was £76,067,803 in respect of which, the Report states, the State liability spread over a period of years is approximately £35,750,000.

Schemes on a Wages Basis.—In these schemes grants are made on the basis of 75 per cent.* of the wages paid to unemployed men taken on for the work.

* Previous to August, 1924, this proportion was 60 per cent.

	Financial Limit of Grant.
	£
Roads	1,511,063
Parks, recreation grounds, cemeteries	1,343,701
Gas, water, sewage and sewage disposal	885,498
Tramways	411,100
Painting	300,471
Docks, harbours, quays	290,235
Land reclamation	151,870
Public institutions	197,664
Electricity	72,016
Miscellaneous	66,235
Total	5,229,853

The total estimated cost of all the schemes approved for grants on a wages basis up to June, 1926, was £17,139,067, the cost to the State, as shown in the foregoing table, being approximately £5,230,000.

Public Utility Companies' Works.—Grants are made on the basis of a percentage of the interest on the capital cost of new works for a period of years, not exceeding fifteen.*

	Total amount approved for Grant.
	£
Gas Undertakings	1,606,592
Docks	1,224,097
Water Undertakings	164,996
Tramways and Light Railways	236,926
Electricity Undertakings	227,600
Total	3,460,211

The total estimated cost of these works was £3,711,600, the State liability spread over a period of years being approximately £500,000.

Summary.—The results may be summed up in the following table :—

	Cost of Schemes Assisted.	Approximate State Liability.
	£	£
Loan schemes (total amount of loans)	76,067,803	35,750,000
Schemes on wages basis	17,139,067	5,230,000
Public utility companies' works	3,711,600	500,000
Total	96,918,470	41,480,000

* This scheme did not commence until October, 1923.

Present position.—On the 15th December, 1925, the Committee issued a circular to local authorities, the effect of which was to reduce very considerably the extent of the Committee's operations. The Fifth (Interim) Report of the Committee stated that the results in the twelve months June, 1925, to June, 1926, showed a substantial diminution as compared with previous years; and that, broadly speaking, it would appear that the scheme, which had been in operation for six consecutive winters, had, largely for that very reason, passed the period of its greatest utility.

(5) PREFERENCE IN PUBLIC CONTRACTS.

The following resolutions on this subject were passed at the Imperial Economic Conference held in October and November, 1923 :—

(1) "That this Imperial Economic Conference re-affirms the principle that in all Government contracts effective Preference be given to goods made and materials produced within the Empire except where undertakings entered into prior to this Conference preclude such a course or special circumstances render it undesirable or unnecessary."

(2) "That so far as practicable, efforts be made to ensure that the materials used in carrying out contracts be of Empire production."

(3) "That State, provincial and local government authorities should be encouraged to take note of the foregoing resolutions."

Action on the lines indicated in the resolutions had already been taken in this country before the Conference. So far as *Government contracts* are concerned, it had long been the general practice of the Departments to place their contracts in this country so far as practicable, and in February, 1919, the Treasury issued instructions that an effective preference should be accorded to the Dominions, Colonies and Protectorates as compared with other overseas sources of supply. In January, 1924, the Treasury issued a circular calling the attention of the Departments to the resolutions of the Imperial Economic Conference quoted above. The general position was stated in the following terms by the Financial Secretary to the Treasury in an answer to a question in the House of Commons on 20th July, 1925 :—"Effective preference is to be given to British products in contracts by the Departments. Only in exceptional cases are orders placed with foreign manufacturers, and such cases are subjected to review in the Departments before orders are given."

Contracts by local authorities.—Circulars were issued by the Ministry of Health and the Scottish Office in May and June, 1923, informing local authorities in England and Wales, and in Scotland respectively, that the Government had decided that, as regards all works in respect of which grants were given expressly because of unemployment by the Unemployment Grants Committee or by any Government

Department, it should be a condition of the grant that all contracts for or incidental to the works should be placed in this country. The circular also urged that, in view of existing conditions, the same principle should be adopted, in the absence of special circumstances, in the case of all contracts in respect of works carried out by local authorities, whether or not the expenditure on the works was assisted by grants from the National Exchequer or from the Road Fund.

In March, 1925, further circulars to local authorities were issued by the Ministry of Health and Scottish Office quoting the terms of the Resolutions of the Imperial Economic Conference mentioned above, and stating that the Government would be glad if the matter were considered by the local authority with a view to giving effect to the Resolutions, subject to the condition that, in view of the existing special circumstances with regard to unemployment, no alteration should be made in the policy laid down in the circulars of 1923 with regard to the placing of contracts in this country.

In March, 1926, the Ministry of Health issued a circular to local authorities in England and Wales as to the desirability of giving contracts to firms on the King's National Roll (i.e., firms employing a specified proportion of disabled ex-Service men), and this circular included a paragraph drawing renewed attention to the previous circulars of May, 1923, and March, 1925, with regard to contracts, and emphasising the help that may be given to British trade if local authorities will not only place their contracts with British firms, but also make sure that so far as is reasonably practicable British material and components only are used in the goods purchased.

The conditions laid down by the Ministry of Transport in connection with grants for road works expedited for the relief of unemployment (including the grants in respect of works carried out under the Trunk Road Scheme) require that all contracts are to be placed in this country and that British-made plant and machinery and British-produced materials are to be used in the execution of the works, unless the Minister of Transport agrees otherwise.*

Customs Duties.

The customs tariff of this country now contains a number of import duties on manufactured articles which were not in operation before the war. These may be discussed under four headings :—

(i) "McKenna" duties.
(ii) Silk duties (Customs and Excise).
(iii) Key industry duties.
(iv) Safeguarding of industry duties.

Legislative provision also exists for the imposition of

(v) Dumping duties,

though no such duties have, in fact, been imposed.

* See page 389 as to the conditions imposed under the Trade Facilities Acts regarding the use of British plant and materials.

Another change which has been effected in the Customs system of the country since the war is the introduction of the principle of Imperial Preference.

A note on this subject is given below, together with a paragraph on the Customs treatment of foreign goods.

(i) "McKENNA" DUTIES.

The "McKenna" duties, so called owing to their first introduction by Mr. Reginald McKenna when Chancellor of the Exchequer in 1915, applied originally to motor cars, motor bicycles and tricycles, and their accessories and component parts other than tyres; to musical instruments, including gramophones, pianolas and similar instruments, their accessories and component parts; to clocks and watches and their component parts; and to cinematograph films.

So far as the three classes motor vehicles, musical instruments and clocks and watches are concerned, the rate of duty imposed by the Finance (No. 2) Act, 1915, was 33⅓ per cent. *ad valorem*, but it was provided that motor omnibuses, ambulances and fire-engines, and motor vehicles used for the commercial carriage of goods, and accessories and component parts of any of these should be exempt from duty. The duties imposed on cinematograph films were in the case of blank film ⅓*d.* per linear foot of the standard width of 1⅜ inches, in the case of positives 1*d.* per foot, and in the case of negatives 5*d.* per foot.

The duties were not imposed for protective purposes. The Chancellor of the Exchequer in his Budget speech on 21st September, 1915, stated the reason for the introduction of these duties as follows: "I have already referred to the need to maintain our foreign exchanges and to cut down, so far as we can, expenditure on imported luxuries . . . . I put forward now . . . . a list of articles the importation of which may properly be restricted by means of duties, in time of war, on both the grounds I have mentioned, namely, foreign exchange and luxuries. So far as the duties do not put an end to importation they may be a source of revenue not to be neglected." The duties were renewed annually during the succeeding eight years, and by the Finance Act of 1919 were reduced by one-third in the case of articles consigned from and produced or manufactured within the British Empire.

In 1924 the duties were allowed to lapse and were not levied after 1st August of that year. Mr. Snowden, the Chancellor of the Exchequer, when announcing the decision of the Government, stated in the House of Commons on 28th April, 1924, that "as this question of the imposition of duties upon imported manufactured articles was made an issue by the late Government at the last General Election and the country gave the most decisive verdict against them," the new Government "are bound to give effect to that popular decision."

By the Finance Act, 1925, the duties were re-imposed by the Government of the day with the Empire preference provided by the Finance Act of 1919, and took effect on 1st July, 1925. In his Budget speech of 28th April, 1925, Mr. Churchill referred to the reasons for originally imposing these duties, and stated that " every one of those reasons exists to-day. If those articles were luxuries then, they are luxuries now. If there was a need to diminish luxury importation from the United States of America then on account of the dollar exchange, has that need become any less urgent on the morrow of our return to the gold standard? The duties," said the Chancellor, " are to me a revenue. They will bring in £1,600,000 a year in the first year and nearly £3,000,000 in a full year. We cannot afford to throw away a revenue like that . . . . and the duties must be restored."

By the Finance Act, 1926, the exemption from duty of commercial and certain other motor vehicles and their accessories and parts which had previously existed was removed as from 1st May, 1926, the 33⅓ per cent. *ad valorem* duty being then applied to these vehicles and their accessories and parts, other than tyres. Mr. Churchill stated in the House of Commons on 26th April, 1926, that " there is . . . . no case for the protection of the industry, nor is that in any way my object. The reasons on which I justify this tax are two. First of all, it is the only Customs duty I have ever heard of the imposition of which will positively simplify and diminish the work of the Customs authorities . . . . The line of division between the commercial and the pleasure car is wavering and nebulous. It is becoming increasingly difficult to separate one from the other. The spare parts are in many cases identical. One type is readily converted into another, permanently or for an occasion. An import duty which depends not upon the character of the article but upon the use to be made of it is bound to produce special difficulties. It has done so in this case, and it is doing so in increasing degree. That is my first reason for including the commercial motor car, although it is not a luxury, within the ambit of the so-called McKenna Duties. My second reason is that the tax will yield £300,000 in the first year and £350,000 in a full year."

(ii) SILK DUTIES.

Customs duties were imposed by the Finance Act, 1925, on imported natural and artificial silk and articles made thereof, with corresponding Excise duties on home-made artificial silk. The duties took effect on 1st July, 1925. The Customs rates vary from 1*s.* to 7*s.* 9*d.* per lb., according to whether the silk is waste silk, raw silk, yarn or tissue ; and from 2 per cent. to 33⅓ per cent. ad valorem on made-up goods containing silk. The Excise duties on artificial silk are 6*d.* per lb. on waste, and 1*s.* per lb. on singles, yarn or straw. Empire goods are allowed a preferential rebate of one-sixth of the full Customs duty.

Drawbacks are allowed on exports made from or consisting of duty-paid silk or artificial silk. A few minor modifications in duties and drawbacks were made by the Finance Act, 1926.

Raw silk is not produced commercially in this country, and all manufactures made here of natural silk must, therefore, be derived from imported silk in one form or another, which must have borne Customs duty. Hence no Excise duty is leviable on natural silk products.

The reasons for the imposition of the duties, and the general principles underlying them, were stated by the Chancellor of the Exchequer in his Budget speech in the House of Commons on the 28th April, 1925, as follows :—

> " Now I come to a series of duties of different kinds and of various origins, but which have one feature in common. They all relate to subjects of luxury. They may all be called sumptuary duties or, if that be disputed, at any rate they are certainly optional duties. They are taxes which no man or woman—for women are going to pay their part—need pay unless he or she chooses. They fall on a class of expenditure from which everyone can easily refrain without any detrimental effect on health or morals. In the forefront of these I place a new revenue duty upon silk. . . . Natural, artificial, semi-manufactured, manufactured or made-up silk will be subject to a new revenue duty. . . . Natural silk enters the country at various stages—as raw silk, as silk waste, as thread and as tissue. I propose a carefully calculated scale of duties on all these imports. It is not an ad valorem tax but a specific duty. No natural silk is produced in Great Britain, therefore the whole yield, without any countervailing duty, of the duty on natural silk comes to the Exchequer. I propose that similar specific duties, related to the duties on natural silk, should be levied on all corresponding imports of artificial silk at different stages. In this case, however, if the efficiency of the tax is to be fully maintained, a countervailing duty will be necessary in connection with the very large volume of home production. . . . .
>
> There remains only silk imported in the form of made-up goods, and here again proportionate duties will be levied on all imports wholly or partly consisting of silk, but in this case the duties will have to be ad valorem, as it would be impossible to deal with them on a specific basis."

The duties produced a revenue of £3,199,000 in the financial year 1925–26, and were estimated in the Budget of 1926 to yield £6,500,000 in 1926–27. The yield in the earlier year was much diminished by large imports of duty-free silk prior to the duties coming into force.

(iii) KEY INDUSTRY DUTIES.

The fundamental importance of what later became known as the "key industries" was fully realised for the first time during the late war. The necessity for a rapid expansion of output of all materials required for the prosecution of hostilities, coupled with the cessation of imports from enemy countries, brought home to those responsible for the organisation of supplies the extent to which this country was dependent upon imports of certain indispensable commodities. Articles such as synthetic dyestuffs and drugs, gauges, scientific glassware, tungsten and hosiery latch needles, to instance merely a few, were found to be essential in large quantities for the purposes of the war. As these were made to a very small degree, and in some cases were not made at all, in this country, considerable delay was experienced, at a time of urgent need, before the deficiency could be met either from home sources or by imports from countries other than Germany, hitherto the main source of supply.

Owing to the essential character of each of the substances or articles now under consideration in the manufacture of a large output of war materials or for indispensable national purposes—for example, dyestuffs in the manufacture of military and naval uniforms, drugs for maintaining the health of the military and civil population, gauges for the output of shells, guns and other munitions—the industries concerned with their production came to be regarded as "pivotal" or "key" industries. The terms which had thus arisen from the necessities of the war came later to be applied to certain articles which are vital to the industrial prosperity of the nation, in addition to, or even quite apart from, any warlike purposes to which they might be applicable. The manufacture of the articles in question is not as a rule such as itself to constitute a vast industry employing a large number of hands, but is rather in the nature of an industry which, though perhaps small in the value of its output and in the number of men engaged, is nevertheless the essential requisite to another and considerable industry. The dyestuff industry, for example, a comparatively small industry in this country judged by the number of hands employed, is nevertheless the source of material required by a much more extensive textile industry doing a vast export trade. Hosiery latch needles again, the product of an industry employing but few operatives, are nevertheless essential to the manufacture of a very large proportion of the hosiery manufactured in this country, the exports of which are valued at several million pounds per annum. With regard to all the groups of articles which are classed as the products of key industries, it may be said, therefore, either that their use is essential for the purposes of national defence in its many aspects or that they are necessary in large and important British industries forming an essential part of our commercial life. In most instances they partake of both characteristics.

The experiences of the war not unnaturally gave rise to efforts directed to terminate our dependence on foreign sources of supply for the articles which were the products of key industries. A Committee appointed by the President of the Board of Trade in April, 1916, under the chairmanship of Sir Henry Birchenough, to consider the position of the textile trades after the war, considered in some detail the question of supplies of synthetic dyestuffs and hosiery latch needles. The former subject is dealt with elsewhere (see p. 416). As regards hosiery latch needles, the Committee recommended prohibition of imports, except under licence, for a period of five years, and suggested that at the end of that period such further assistance as might be necessary should be given to the industry in order to maintain an efficient and adequate production of latch needles in this country.

Another Committee, appointed in July, 1916, by the Prime Minister, under the chairmanship of the late Lord Balfour of Burleigh, to consider the question of commercial and industrial policy after the war, carefully considered the question of supplies of articles which they regarded as the products of key industries, such as zinc, tungsten, ignition magnetos, optical and chemical glass, thorium nitrate, gauges and drugs, in addition to synthetic dyestuffs and hosiery needles. They recommended the establishment of a permanent board having among its duties that of framing detailed schemes for the protection and assistance of the industries concerned with articles of the classes referred to. Among the methods of assisting the industries suggested by the Committee were monetary grants, imposition of import duties, and prohibition of importation save under licence. The final report of the Committee was completed in December, 1917, and published in the following year (Cd. 9035).

In the year 1919 it was decided that, while the majority of the import prohibitions which then remained in operation should be brought to an end on September 1st of that year, the existing prohibitions on articles forming the products of key industries should continue, licences being granted at the discretion of the Board of Trade.

In addition to dyestuffs and intermediate products, the articles thus protected by the maintenance of import prohibitions were as follows (see Cmd. 454, issued in 1918) :—

Synthetic drugs (including antiseptics).

Synthetic perfumes and flavourings, synthetic photographic chemicals ; synthetic tannins ; esters and acid derivatives of aromatic hydro-carbons ; alkaloids and their salts (except quinine) ; and certain other specified organic chemicals.

Analytical re-agents and certain other specified fine chemicals ; cerium fluorides and fluorides of other rare earth metals ; optical glass, including lenses, prisms and like optical

devices; scientific glassware; scientific and optical instruments; laboratory porcelain; gauges; magnetos; hosiery latch needles; tungsten powder and ferro-tungsten; thorium nitrate; illuminating glassware; potassium compounds; zinc oxide; lithopone; gas mantles and mantle rings.

The judgment of Mr. Justice Sankey, at the end of 1919 (see p. 418) rendered the above import prohibitions untenable, and in order to meet the position thus created, provision was made in Part I. of the Safeguarding of Industries Act, 1921, for the imposition of an import duty from the 1st October, 1921, at the rate of 33⅓ per cent. *ad valorem*, for a period terminating five years from 19th August, 1921, the date of passing of the Act, on the articles included within the general headings scheduled to the Act. These covered optical glass, optical elements and optical instruments, scientific and lamp-blown glassware, laboratory porcelain, scientific instruments, gauges, wireless valves, vacuum tubes, ignition magnetos, permanent magnets, arc-lamp carbons, hosiery latch needles, tungsten and ferro-tungsten, compounds of thorium, cerium and the other rare earth metals, synthetic organic chemicals, analytical re-agents and other fine chemicals, and chemicals manufactured by fermentation processes. Synthetic organic dyestuffs imported for use as such and organic intermediate products imported for their manufacture were specifically excepted from the scope of the Schedule, as their importation was subject to licence under the Dyestuffs (Import Regulation) Act, 1919 (see p. 419).

The Act provided that no duty should be charged on goods of the nature described above which it could be shown had been consigned from and produced or manufactured within the British Empire.

Provision was made for the Board of Trade to issue lists from time to time defining the articles which are to be deemed to fall under any of the general descriptions in the Schedule, such lists being open to challenge during a prescribed period before a referee appointed by the Lord Chancellor. A list defining a number of the Schedule headings was issued under these powers in September, 1921, and amended slightly at subsequent dates, consequent on decisions given by the referee.

Towards the end of the year 1925 a Committee was appointed by the President of the Board of Trade under the chairmanship of Sir Burton Chadwick, M.P., Parliamentary Secretary to the Board, to inquire into and report upon the effect of Part I of the Safeguarding of Industries Act, 1921, on the development of the industries covered by the Schedule to the Act, and upon the desirability or otherwise of extending the period of operation of the Act and making additions to the Schedule.

The Committee presented their Report at the end of March, 1926. They pointed out that certain products which were initially safeguarded owing, in large measure, to their use in war-time, had

since proved to be of fundamental importance in British industries and in scientific research of all kinds. They also pointed out that while some of the products covered by the Act might at some future date be displaced from their present applications and importance, nevertheless such displacement was unlikely to take place during the course of the next few years; and that where industries producing a large range of articles (such as the chemical and optical instrument industries) were concerned, though their various products might change in importance from time to time, and might even be entirely displaced by other new articles or substances, the individual industries as a whole would undoubtedly continue to be of great national importance, and the subject of ever-growing demands.

After detailed consideration of each of the industries included under their terms of reference (see Annex D, p. 435, for summary of findings) the Committee recommended :—

(1) That in the case of the majority of the products covered by Part I of the Safeguarding of Industries Act, the existing duty should be continued but that the question should be considered of increasing the rate of duty on hosiery latch needles so as more nearly to compensate for the labour advantage possessed by Continental manufacturers.

(2) That the duty on optical glass, optical elements and optical instruments should be increased from 33⅓ to 50 per cent. *ad valorem*.

(3) That component parts of dutiable optical and scientific instruments should be made dutiable.

(4) That the existing *ad valorem* duty of 33⅓ per cent. on arc lamp carbons should be replaced by a specific duty of 1*s*. per lb. weight.

(5) That power should be taken to exempt from the safeguarding duty any article or substance not made and not likely to be made in the United Kingdom in substantial quantities.

The Committee also recommended certain additions to the list of goods subject to 33⅓ per cent. duty, namely (*a*) amorphous carbon electrodes, the manufacture of which in this country for the production of special steels in electric furnaces they considered of great importance; and (*b*) molybdenum, ferro-molybdenum, molybdenum compounds vanadium and ferro-vanadium, the value of which was emphasised by the Committee in connection with the manufacture of alloy steels having very special properties.

As regards the period of any extension of the safeguarding duties, the Committee pointed out that the manufacture of new articles and substances, and the change from small scale to mass production, involve considerable financial outlay for new plant and machinery,

and, in many cases, extended research work. Manufacturers are loath to undertake this without a reasonable prospect of their market being secured to them, so far as may be practicable, for such a period that the fruits of research may be translated into manufacturing practice, and that a reasonable proportion of the expense of the research and new plant may be paid off without prolonged delay. To continue a safeguarding duty merely from year to year without any certainty of renewal at the end of each year would, the Committee considered, in large measure defeat expansion along new lines of the industries in question. In view of these considerations, and also because, in the case of some industries, the evidence indicated definite and determined attempts by foreign manufacturers to cripple the British output, the Committee recommended that, in the case of all the industries affected, the period of any further safeguarding should be for a minimum of five years, and preferably for ten years.

The recommendations of the Committee were carried into effect, practically in their entirety, by the Finance Act, 1926, which provided that Part I of the Safeguarding of Industries Act, 1921, should continue in operation for a further period of ten years from August 19th, 1926, subject to alterations, as recommended by the Committee, in the rate of duty on optical glass, elements and instruments and on arc-lamp carbons. Duties of 33⅓ per cent. *ad valorem* were imposed on the new items suggested by the Committee with the exclusion of primary battery carbons from the scope of the term "amorphous carbon electrodes," and the addition of all vanadium compounds. All component parts of optical and other scientific instruments were made liable to the same rate of duty as the complete instruments. The alterations of duties and new duties became operative on 1st May, 1926.

Power was also taken by the Finance Act to suspend any article from liability to duty for a specified period if the degree of manufacture within the British Empire was not substantial having regard to the current consumption of the article in the United Kingdom.

(iv) SAFEGUARDING OF INDUSTRY DUTIES.

The question of taking measures for the protection of British industries from the effects of the depreciation of the currency in foreign countries became a matter of great public interest shortly after the termination of the war. In his statement to the House of Commons on 18th August, 1919, on commercial and industrial policy, the Prime Minister stated that it was proposed that the Board of Trade should be equipped with emergency powers to check a sudden and undue importation of goods at prices altogether below the cost of production in the United Kingdom owing to the collapse of exchange.

After considerable discussion as to the most appropriate means of dealing with the situation, a definite step was taken by the enactment of Part II of the Safeguarding of Industries Act, 1921. This Act made provision whereby a duty of 33⅓ per cent. *ad valorem* could be imposed on goods of any particular description (other than articles of food or drink) imported from a foreign country with a depreciated currency, where, owing to the depreciation of the foreign currency, such goods were being offered for sale in the United Kingdom at low prices, and where in consequence employment in the British industry was or was likely to be seriously affected.

The procedure which was followed in dealing with applications under the Act may be thus summarised :—

(*a*) A *prima-facie* case had first of all to be made out to the Board of Trade that the foreign goods were being sold or offered for sale in the United Kingdom at prices which, by reason of depreciation in the value, in relation to sterling, of the currency of the country in which the goods were manufactured, were below the prices at which similar goods could be profitably manufactured in the United Kingdom, and that by reason thereof employment in any industry in the United Kingdom was being or was likely to be seriously affected.

(*b*) The Board were then empowered to refer the application for enquiry to a Committee selected from a panel consisting mainly of persons of industrial or commercial experience. The Committee was required to report, after public enquiry, whether the conditions indicated above were fulfilled. They had also to report whether production in the industry manufacturing similar goods in the United Kingdom was being carried on with reasonable efficiency and economy, and as to the effect which the imposition of a duty on the goods in question would exert on employment in any other industry, being an industry using goods of that description as material.

(*c*) In the event of the Committee reporting that the major conditions indicated in paragraph (*a*) above were fulfilled and that the British industry was efficient, the Board of Trade, after taking into consideration their conclusions as to the effect of a duty on using industries, might make an order applying the Act to goods of the description referred to manufactured in the particular foreign country in question. Such goods thereupon became subject to an import duty of 33⅓ per cent. No such order might be made, however, which was at variance with any treaty, convention or engagement with any foreign state in force for the time being.

(*d*) If the House of Commons were sitting at the time, the order could only be made after the passing of a resolution of the House approving the draft. If the House were not sitting, the order might be made forthwith, but was not to remain in force for more than one month after the reassembling of the House of Commons unless a resolution was passed by the House to that effect. No order was to remain in force after a period of three years from the passing of the Act.

It will be observed that Part II of the Safeguarding of Industries Act, 1921, only permitted the imposition of duties on goods coming from particular foreign countries in respect of which the conditions of the Act were fulfilled. This rendered it impossible to issue orders relating to goods manufactured in countries having rights to most-favoured-nation treatment in the United Kingdom in respect of import duties, without first denouncing the commercial treaties with those countries, a step which was not considered to be justified. Somewhat similar considerations applied in the case of other countries with which mutual most-favoured-nation treatment existed in practice, although no formal treaty stipulations existed on the subject.

Annex D (2), page 447, gives a list of the goods in respect of which applications were referred to Committees under the Act, together with a list of the goods in respect of which orders imposing duties were made. It will be observed that in no cases were duties imposed on goods manufactured in any other country than Germany, that being the country to which nearly all the applications referred to Committees related. The duties were imposed in August and October, 1922, and came to an end in August, 1924, when the provisions of the Act relating to the imposition of duties on the ground of the effect of depreciated currencies expired, on the conclusion of three years from the passing of the Act.

Undertakings were given on behalf of the present Government, before the General Election in the autumn of 1924, that " proposals for a general tariff will not again be submitted except upon clear evidence that on this matter public opinion is disposed to reconsider its judgment," and that there would be no taxation of food. The intention was expressed, however, of dealing, so far as practicable, with " industries suffering from unfair foreign competition arising from depreciated currencies, from lower wages and other standards of life, by some means analogous to that of the Safeguarding of Industries Act, by which special measures may be taken to deal with special cases after due inquiry and consideration." The matter was referred to in the King's speech at the opening of Parliament on 9th December, 1924; and in February, 1925, a White Paper (Cmd. 2327) was issued indicating the procedure to be followed for giving effect to this policy. A copy of this Paper is given in Annex E (1), page 447.

It will be seen that the object of the procedure is to safeguard British industries of substantial importance which are suffering from unfair competition arising from one or more of the following causes:—

(*a*) Depreciation of currency operating so as to create an export bounty.

(*b*) Subsidies, bounties, or other artificial advantages.

(*c*) Inferior conditions of employment of labour, whether as respects remuneration or hours of employment, or otherwise, obtaining amongst the persons employed in the production of the imported goods in question as compared with those obtaining amongst persons employed in the production of similar goods in the United Kingdom.

It has to be established that foreign goods of the description in question are being imported in abnormal quantities and are being offered for sale at prices below those at which similar goods can be profitably produced in this country; that in consequence employment here is being or is likely to be seriously affected; and that the exceptional competition comes largely from countries where the conditions are so different from those in this country in one or more of the respects indicated above as to render the competition unfair. Account has to be taken, as under the Act of 1921, of the efficiency of the British industry, and of the effect of a duty on any British industry using the goods in question in further production.

If the Board of Trade are satisfied that a *prima-facie* case has been established under Section I of the White Paper, the claim is referred for enquiry to a Committee, and the Government will not consider the imposition of a safeguarding duty unless the Committee after public enquiry report that one ought to be imposed. If the Committee reach the conclusion that a case has been made out for the imposition of a duty they have to indicate what rate of duty is in their opinion required to countervail the unfair competition found to exist. Duties are not imposed by order of the Board of Trade, but the Government's proposals are laid before Parliament in a Finance Bill. The duties are not limited to the goods of a particular country, but apply equally to imports from all foreign countries.

Annex E (2), page 450, gives a list of the cases in which, up to 31st December, 1926, applications under the new procedure have been referred to Committees, together with the result of the applications.

In addition to the applications shown in the Annex as having been referred to Committees, an application was received in June, 1925, under this procedure for the imposition of import duties on pig iron, wrought iron, heavy steel products, and wire, wire netting and woven wire. This application was suspended by the Government pending an exhaustive enquiry into the general position of the iron and steel industry by the Committee of Civil Research.* On 21st December, 1925, after this Committee had reported to the Cabinet,

* See page 382.

the Prime Minister stated, in answer to a question in the House of Commons, that had H.M. Government been able to deal with the iron and steel industry in isolation they might have regarded the case for enquiry under the safeguarding of industries procedure as complete, but that it had become clear that the safeguarding of a basic industry of this magnitude would have repercussions of a far wider character, which might have been held to be in conflict with the Government's declaration in regard to a general tariff. They had, therefore, come to the conclusion that the application could not be granted.

(v) DUMPING.

This subject was dealt with in the report of the Committee on Commercial and Industrial Policy, who recommended that legislative action should be taken through the imposition of import duties for the prevention of dumping at prices below the fair market value in the country of origin ; and it was referred to in the Prime Minister's speech on the industrial position on 18th August, 1919.

Legislative provision for the prevention of dumping was included in Part II of the Safeguarding of Industries Act, 1921. The Act provides for the imposition of a duty of 33⅓ per cent. *ad valorem* on the importation of goods of any description (other than articles of food or drink) manufactured in a country outside the United Kingdom, where it is shown that goods of that description from that country are being sold or offered for sale in the United Kingdom at prices below the cost of production (as defined in the Act) in the country of origin. The expression " cost of production " is defined as meaning the current sterling equivalent of 95 per cent. of the wholesale price at the works charged for goods of the specified description for consumption in the country of manufacture (deducting any excise or other similar internal duty which may be included in the price). The procedure prescribed by the Act for dealing with cases in which dumping below the cost of production is alleged, is the same as that prescribed for applications relating to safeguarding from the effects of depreciated currency. In the event of the imposition of a duty under these provisions of the Act, it is provided that payment is to be remitted in any instance in which it is shown that the goods have already been sold in the United Kingdom at a price not less than the cost of production as defined ; and repayment of duty paid may be claimed in any instance in which it is shown that the goods were on the first sale thereof in the United Kingdom sold at a price not less than the cost of production.

The duration of the provisions relating to such dumping is not limited, and consequently those provisions are still in force. They have not been utilised to the same extent as those relating to currency depreciation. Only two cases (relating to glass bottles and vulcanised fibre) have up to the present been referred to Committees, and in neither case did the Committee find that the conditions of the Act were fulfilled.

STATISTICS.

Annex F, page 453, shows for a series of years the value of the imports into the United Kingdom which were subject to the Customs duties described above, as compared with the value of those subject to other Customs duties, and the total value of all imports.

IMPERIAL PREFERENCE.

In the case of most classes of goods which are subject to Customs duties, the duties are charged at reduced rates on goods of Empire origin under the scheme of Imperial Preference which was instituted in 1919. The scheme has since undergone various alterations, as will be seen from the brief account of its origin and development given in the following paragraphs.

*The pre-*1919 *Proposals.*—The question of introducing the principle of preference into the tariff of the United Kingdom was raised at various "Colonial Conferences," and, in particular, at the Conference of 1907. It was again brought into prominence in 1917, when the Imperial War Conference passed the following resolution :—

> "The time has arrived when all possible encouragement should be given to the development of Imperial resources, and especially to making the Empire independent of other countries in respect of food supplies, raw materials, and essential industries. With these objects in view, this Conference expresses itself in favour of :—
>
> "(1) The principle that each part of the Empire, having due regard to the interests of our Allies, shall give specially favourable treatment and facilities to the produce and manufactures of other parts of the Empire.
>
> "(2) Arrangements by which intending emigrants from the United Kingdom may be induced to settle in countries under the British flag."

The Scheme of 1919.—Imperial Preference was actually introduced into the tariff by section 8 of the Finance Act, 1919, which provided that where certain goods, already subject to Customs duty, were shown "to have been consigned from and grown, produced or manufactured in the British Empire*" they should be entitled to a preferential rebate. The rebate was 30 to 50 per cent. of the full duty on wine; one-third of the full duty on cinematograph films, clocks and watches, motor cars and motor cycles, and musical instruments; and one-sixth of the full duty on the other articles

* The "British Empire" for this purpose means all British Dominions outside Great Britain and Northern Ireland, including British India, the Indian Native States and all British protectorates. Under the Finance Act, 1919, power was given to include by Order in Council within the definition any territory administered under British mandates. This power has been exercised in the case of South West Africa, Tanganyika, Cameroons (British sphere), Togoland (ditto), New Guinea, and Western Samoa.

affected. The rates of Excise duty in force on such of the articles as were produced in the United Kingdom (viz., those on sugar, glucose, molasses, saccharin, chicory, and tobacco) were correspondingly reduced. In the case of spirits, a preference was granted by means of a small increase of the Customs duty on non-Empire spirits.

The Finance Act, 1919, authorised the Board of Trade—

(*a*) To prescribe by Regulations what proportion of the value of goods resulting from labour within the British Empire should entitle the goods to be deemed to have been manufactured in the British Empire ; and

(*b*) To make an Order, in the case of any class of goods manufactured to a considerable extent in the British Empire from material not wholly grown or produced in the Empire, directing that the preferential rebate should be allowed only to such proportion of those goods as corresponded to the proportion of dutiable material used in their manufacture shown to have been grown or produced in the Empire.

The effect of the Regulations and Order made by the Board of Trade under this provision is as follows :—

(*a*) Goods are not deemed to have been "manufactured in the British Empire" unless 25 per cent. of their value is the result of labour within the Empire, the word "labour" being interpreted as including the value of materials as well as other manufacturing costs. Thus manufactured goods are eligible for preference at the full rate if at least 25 per cent. of the factory or works cost to the manufacturer is Empire, and this percentage can be made up either by using Empire materials or by applying manufacturing processes within the Empire to foreign materials, whether raw or semi-manufactured, or foreign component parts, or in both ways.

(*b*) The Order made under (*b*) above applies to manufactured tobacco, refined sugar, molasses and extracts from sugar, manufactured from a mixture of Empire and non-Empire raw material. For example, refined sugar which is the product of equal quantities of Empire and of non-Empire raw sugars is chargeable as regards 50 per cent. of its weight at the rate leviable on foreign sugar, and as regards the remaining 50 per cent. at the preferential rate of duty. This special class of tobacco and sugar articles is thus treated differently from other manufactured articles ; in the case of the latter, the preferential rebate is allowed on the total value of the article as imported, provided that at least 25 per cent. of that value is the result of Empire labour, but in the case of the former, rebate is allowed only in respect of that proportion of the finished article which has been produced from Empire raw material.

For articles in this special class, therefore, it was unnecessary to fix so high a labour value percentage as 25 per cent., and 5 per cent. was taken merely in order to exclude from preference articles falling within the special class which contain but a trifling quantity of Empire raw material.

Where manufactured goods are not, on importation into the United Kingdom, liable to duty in themselves, but only in respect of the dutiable ingredient or ingredients they contain, preference is only granted in respect of such of the ingredients as themselves satisfy the prescribed conditions.

Except for the exemption of Empire goods from the scope of the Key Industry and Depreciated Currency duties imposed under the Safeguarding of Industries Act, 1921 (*see* pages 404 and 407), the scheme of preference thus established remained unchanged until 1925. But the actual amount of the preferential rebate varied with changes in the full duty. The wine duties were increased and the motor spirit duty was repealed in 1920. The duties on tea, cocoa, coffee, and chicory were reduced in 1922 and again in 1924. The duties on sugar and cognate articles and on dried fruits (except currants) were reduced, and the duties on cinematograph films, clocks and watches, motor cars and motor cycles, and musical instruments were repealed, in 1924.

The Legislation of 1925.—In 1925 several changes were made in the original scheme as a result of the Imperial Economic Conference held in 1923. At that Conference the Imperial Government made various proposals in regard to tariff preferences on Empire products, which, in view of the subsequent development, may conveniently be summarised in the following three groups, viz. :—

(1)

(*a*) To admit *dried raisins, figs and plums* of Empire origin, free of duty.

(In 1923 the full duty was 10*s.* 6*d.* per cwt., and the amount of the preferential rebate (one-sixth of the full duty) was 1*s.* 9*d.* per cwt. In 1924 the full duty was reduced to 7*s.* per cwt., and the amount of the preferential rebate automatically became 1*s.* 2*d.* per cwt.).

(*b*) To provide that the preferential rebate from the duty on *sugar* should continue at its existing amount for a period of 10 years or for so long within that period as the duty on non-Empire sugar did not fall below that amount.

(In 1923 the full duty was 25*s.* 8*d.* per cwt., and the amount of the preferential rebate (one-sixth of the full duty) was 4*s.* 3⅓*d.* per cwt. In 1924 the full duty was reduced to 11*s.* 8*d.* per cwt., and the amount of the preferential rebate automatically became 1*s.* 11⅓*d.* per cwt.).

(*c*) To increase the preferential rebate from the duty on *tobacco* from one-sixth to one-fourth.

(*d*) To increase the preferential rebate from the duty on *wine* exceeding 30 degrees of strength from 33⅓ to 66⅔ per cent., and from the surtax on sparkling wine from 30 to 50 per cent.

(2)

To admit dried *currants* of Empire origin free of duty, and to consider the question of increasing the duty on currants of non-Empire origin.

(3)

To impose new duties on the undermentioned products of non-Empire origin, while continuing to admit such products of Empire origin free of duty :—

Various dried and preserved fruits other than those mentioned at 1 (*a*) and 2 above.
Raw apples ;
Canned salmon and canned lobster, crayfish and crabs ;
Honey ;
Lime, lemon and other fruit juices.

By the Finance Act, 1925, effect was given to the proposals in group (1) and the first part of the proposal in group (2). Dried raisins, figs, plums, and currants from the Empire were freed from duty ; the preference on sugar was raised to 4s. 3½d. per cwt., and stabilised at that amount for 10 years so long as the full duty did not fall below that figure ; and the preferences on tobacco and wine were increased as proposed. The latter part of the proposal in group (2) and the proposals in group (3) were not proceeded with, and in lieu the Government decided to make a yearly grant to be applied to schemes for furthering the marketing of Empire products in this country.*

Moreover, the following preferential rebates in favour of Empire products were granted from the new, or revived Customs duties imposed by the Finance Act, 1925, and the Safeguarding of Industries (Customs Duties) Act, 1925, viz. :—

Cinematograph films. Clocks and watches. Motor cars and motor cycles. Musical instruments. Lace and embroidery. Hops. Cutlery. Gloves. Gas mantles.	One-third of the full duty.
Silk. Artificial silk.	One-sixth of the full duty.

The Legislation of 1926.—The Finance Act, 1926, made further alterations in the preference scheme. First, a preferential rebate of one-third was granted from the new Customs duty on packing and wrapping paper in favour of Empire products. Secondly, following the precedent of 1925 in regard to sugar, it was enacted that for a period of 10 years from 1st July, 1926, all the existing preferential rebates of Customs duty for Empire products should be, as regards goods liable to *specific* duties, the *amounts* of the preferential rebates in force immediately before that day, and, as regards goods liable

*See pages 384-5.

to *ad valorem* duties, the *proportions* of the values of the products which the preferential rebates in force immediately before that day bore to such values, subject to the proviso that if within that period the full Customs duty was in any case reduced below such amount or proportion, the Empire product in question would then be admitted free, the preference thus falling to the amount of the reduced full duty. Thus, subject to the proviso, the various preferences were protected against decrease in the event of a reduction of the full duty.

Table I in Annex G, page 454, shows the articles to which, as the result of the various steps described above, Imperial preference applies, together with the amounts of the preferences in force. Table II, page 455, shows, as regards the articles entitled to preference, the consumption of Empire and foreign goods respectively in the year ended 31st March, 1926, and the proportion of the Empire goods to the total.

CUSTOMS TREATMENT OF FOREIGN GOODS.

No discrimination in the matter of Customs duties is in force in this country as regards goods imported from different foreign countries. In a large number of cases, of course, there are treaties laying down that most-favoured-nation treatment must be accorded to the goods of particular countries on importation into the United Kingdom. In one or two cases (e.g. France and Peru) such treaties as are in force make no specific provisions, and either, as in the former case, definitely leave it to the internal legislation of the country concerned, or, as in the latter, omit any reference to Customs duties at all. In certain other cases there are no treaties in force (e.g. Brazil, Chile, Ecuador, Guatemala, &c.). Nevertheless, in practice goods imported from all foreign countries into the United Kingdom are treated in exactly the same way in regard to Customs duties ; and this has for long been the normal practice. An exception occurred during the period between 1922 and 1924, when depreciated currency duties were in force on certain articles under Part II of the Safeguarding of Industries Act 1921 (see page 408), as these duties were levied only on German articles of the descriptions concerned.

Import Prohibitions

with special reference to the

Dyestuffs (Import Regulation) Act.

In the years before the war, the import prohibitions in force in this country were either of a special character relating to such matters as patented goods and copyright books, falsely marked goods, gold and silver plate (in connection with hall-marking), etc., or were intended to safeguard public health and morals. Import prohibitions were not imposed for the purpose of exerting any protective effect on individual manufacturing industries as such

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though a possible exception to this statement is to be found in the Foreign Prison-Made Goods Act, 1897, which prohibited the importation of goods proved to have been made wholly or in part in any foreign prison or penitentiary except goods in transit or not imported for the purpose of trade or not manufactured in the United Kingdom. It is understood, however, that, while a certain number of complaints have been lodged, the difficulties of securing the necessary proofs of prison origin have been too great to allow the Act to be applied, except in one case in 1898 affecting a small quantity of mats consigned from Belgium, when mats to the value of £183 were seized and destroyed.

During the war period, the importation of manufactured goods had necessarily to be discouraged on grounds of international finance and exchange, and it was also restricted through shortage of shipping space, which was naturally reserved primarily for the carriage of foodstuffs, raw materials and other commodities required for the prosecution of the war. For this purpose, import prohibitions were imposed on an extensive scale, and in August, 1919, there remained in operation 32 proclamations under which the importation of over 170 articles or classes of articles was prohibited. In announcing the commercial and industrial policy of the Government in the House of Commons on 18th August, 1919, the Prime Minister stated that the import restrictions had been maintained as an interim trade policy in order to shield industry during the time of demobilisation and during the change from war conditions to peace conditions. As, however, there was no further justification for them and the only result of continuing them would be to put up prices artificially, the Government had decided to bring them to an end. The necessary action for this purpose was taken shortly afterwards and a general licence was issued having the effect of abrogating as from 1st September, 1919, the restrictions on the importation of all the goods in question with the exception of hops, and of certain commodities which were regarded as the products of "key" industries (see p. 403). Among the commodities which thus remained subject to prohibition of import, were intermediate products capable of being used as dyestuffs or of being manufactured into dyestuffs, together with all synthetic colours, dyes, etc. (For full details see Cmd. 454, issued in 1919.)

The position of the dyestuffs industry had received attention from an early date in the war. In the Report [Cd. 9070] of the Departmental Committee appointed by the Board of Trade in April, 1916, to consider the position of the textile trades after the war, it was stated that, in the year 1913, out of the total exports of textiles from the United Kingdom, valued at about £200,000,000, goods in which dyes were used in one form or another were estimated to represent about £80,000,000, and that in the same year 18,000 tons of synthetic dyes valued at £1,890,000 were imported, of which at least 90 per

cent. came from Germany. British home production of dyes did not exceed one-tenth of the total consumption, but that percentage did not convey an accurate idea of this country's lack of independence, for a considerable part, and probably the greater part, of British pre-war production was from foreign-produced intermediates. This position caused serious difficulties to the textile trades after the outbreak of war when the chief source of supply was cut off, and the Board of Trade found it necessary to take immediate action in co-operation with the various interests concerned. As a result of prolonged discussion, there was formed in March, 1915, a company called British Dyes Limited, which was intended to be a combination of dye users for the manufacture of dyes. Substantial financial assistance was given to the company by His Majesty's Government in the form of an advance up to a maximum of £1,700,000 secured by debentures, but paying only a low rate of interest. In addition, the Government undertook to make a grant to the company of £100,000 within ten years for scientific research in respect of the production of synthetic dyestuffs. British Dyes Ltd. (which acquired as a nucleus of the new undertaking a Company already in existence but operating on a small scale) did not altogether fulfil the expectations of its promoters, (largely because its chief energies had to be directed almost at the outset to the manufacture of explosives), but it gradually increased its output of dyestuffs and laid the foundation of a large producing plant which would be available when the demand for explosives became less insistent. A number of other companies had meanwhile been actively engaged in the production of dyestuffs; and one in particular, Messrs. Levinstein, Limited, had made great progress in the actual output of dyes on a large commercial scale. It was believed that more rapid progress would be made if the efforts of the various producing companies were co-ordinated; and it was urged by dye users generally that the Board of Trade should take steps to bring about complete co-ordination of the work of the most competent companies engaged in making dyes by some arrangement which would put an end to overlapping and waste of effort.* It was also urged that such financial assistance as might be necessary should be given to the manufacturers, either by subsidy or by way of loan. The means adopted to give effect to this last proposal are discussed elsewhere. (See p. 386.)

The committee above mentioned also pointed out that in the best of circumstances the whole problem could not be solved by the end of the war, and that more or less dyestuffs would have to be imported,

* The results of these representations was the formation in 1918 of the British Dyestuffs Corporation, Ltd., which absorbed British Dyes, Ltd., Messrs. Levinstein, Ltd., and other dye manufacturers. It was subsequently found that the capitalisation of the Corporation was in excess of requirements, and a scheme of re-organisation was adopted in 1925, under which the Government shareholding of £1,700,000 was written off in exchange for a cash payment of £600,000.

at all events for a time after the conclusion of peace. In these circumstances, they supported the proposal that the importation of foreign dyes should be prohibited for a term of years except under licence, considering that this system would be preferable to the imposition of duties, since the German industry (which had enjoyed practically a monopolistic position before the war, had great scientific knowledge and manufacturing experience, and immense productive capacity) would certainly make a great effort to recover its position in the British market. It was, therefore, recommended that the issue of licences should be in the hands of an independent authority whose duty it would be, while fostering the growth and maintenance of the colour-producing industry, to safeguard the interests of colour users by allowing the importation of foreign dyestuffs where they were of kinds not made in this country but really needed by the using industries, or where the prices of British-produced dyes were unduly high. To the general argument that the establishment of a larger dye-making industry here was desirable in order to safeguard the textile industries against the ill consequences of dependence on foreign sources for materials which it was not inherently possible to produce here, was added a further argument based on war-time experience. It was apparent that, great as had been the achievements of individual British chemists, this country had lagged far behind other countries in the industrial application of organic chemistry, of which the synthetic dyestuffs industry, with its derivatives—the manufacture of synthetic drugs, analytical reagents, developers, tannins, etc.—was the most conspicuous instance. The consequences were not only serious shortages of all these commodities, but a shortage of trained industrial chemists who could be utilised in the production of all the chemical requirements of the great war. It was consequently urged that steps must be taken to promote the development of the organic chemical industry generally, and of the synthetic dyestuffs industry in particular, since the latter offered the most promising field of employment for organic chemists. Moreover, dyemaking plant is rapidly adaptable—in some cases it does not even need adaptation—to the requirements of chemical warfare.

Immediately after the termination of hostilities, the Board of Trade published a memorandum (Cd. 9194) describing the measures proposed for the development of the Dye Industry, including a Trades and Licensing Committee with an independent chairman and members representing colour users and dye manufacturers.

Towards the close of 1919, however, a decision was given by Mr. Justice Sankey [(1920) 1. K.B. 773] declaring the illegality of the import prohibitions which had been retained in operation as described above, the effect of this judgment being to terminate all the remaining import restrictions except those specifically provided for under the Customs Consolidation Act, 1876, or other enactments.

In these circumstances the President of the Board of Trade stated in the House of Commons on 18th December, 1919, that the Government proposed to introduce legislation to secure powers to reimpose certain restrictions of a limited character. In fact, however most of the commodities for which it was considered that special treatment was required were later covered by the Safeguarding of Industries Act, 1921 (see p. 404); and the only import prohibition for which legislative provision was made for the purpose of safeguarding industry was that contained in the Dyestuffs (Import Regulation) Act, 1920. This Act provided that, with a view to the safeguarding of the dye-making industry, the importation into the United Kingdom of all synthetic organic dyestuffs, colours and colouring matters, and all organic intermediate products used in their manufacture, should be prohibited, but that the importation of any of the goods thus prohibited might be authorised by Board of Trade licence, in which connection the Act provided that the Board of Trade should constitute a Committee to advise them as to the granting of licences. The Committee consists of five persons concerned in trades using dyestuffs, etc., three persons concerned in their manufacture, and three other persons not directly concerned in either respect. The Act is to continue in force for ten years from its commencement, i.e., till 15th January, 1931.

Owing to the close co-operation which has existed since the Act came into force between the dye-using and dye-making interests, the administration of the Act has proceeded with remarkable smoothness. About 6,000 applications are received annually, and the following table gives particulars of the manner in which these applications have been dealt with during the years 1921 to 1925.

Year.	Granted.		Refused.	
	Lb.	£	Lb.	£
1921 ..	2,677,505	1,042,821	1,539,336	368,378
1922 ..	3,234,893	1,103,819	2,377,283	455,313
1923 ..	3,691,440	989,537	1,321,036	284,457
1924 ..	3,036,234	770,943	1,115,966	201,020
1925 ..	3,399,054	651,584	1,443,943	187,362

From this table it will be observed that, although the quantity of foreign dyestuffs admitted into this country during recent years has remained fairly constant, the average value per lb. of the dyestuffs imported has fallen considerably. The bulk of the imports came from Germany, the only other country sending appreciable supplies being Switzerland.

The Dyestuffs (Import Regulation) Act also provided for the establishment of a Dyestuffs Industry Development Committee to advise the Board of Trade as to the efficient and economical development of the dye-making industry. The primary object of this Committee is to secure the manufacture in Great Britain on the most economical basis of as large a range as possible of the dyestuffs required by consumers. In this connection the Committee reviews periodically the licences granted to import foreign dyestuffs and advises the Board of Trade of any special steps which it is considered should be taken to promote the manufacture of these dyestuffs in this country. According to the latest information available through this committee, rather more than 80 per cent. of the British dyestuff requirements are being met from domestic sources. The total production of dyestuffs in the United Kingdom during the year 1925 was between 32 and 33 million lbs.

This production is spread over all the main classes of dyestuffs, as representatives of all the various groups of colours are now being made by at least one British firm. In the sulphur group the imports have been reduced to negligible quantities, whilst the important colours alizarine red and synthetic indigo are being made in sufficient quantity to meet the whole home demand. Ordinary direct colours, acid colours and basic colours are being produced in adequate quantity and of a quality comparing favourably with the best foreign productions. Some leeway has still to be made up in certain colours possessing special qualities of fastness, whilst the range of vat colours yet available is somewhat limited. Progress is, however, being made steadily and new colours are constantly being added to the British output. The main difficulty at present facing the British dye industry is that of producing at prices competitive with those of foreign manufacturers, but the margin between the two sets of prices is now not very large, and is being gradually narrowed as more and more experience is gained by the British manufacturers.

Treatment of Foreign Enterprises and Individuals as Regards Participation in Industry.

Foreign *enterprises* in the United Kingdom are in general entitled under the Treaty obligations of His Majesty's Government to national treatment in matters of taxation, and otherwise to most-favoured-nation treatment. In practice they receive what amounts to national treatment in every respect.

As regards the participation of foreign *individuals* in industry and commerce in the United Kingdom, certain statutory provisions were enacted during the war, and in the years immediately following it, which restricted the participation of former enemy aliens in certain industries; but these provisions were either enacted only for a limited period which has now expired, or have been repealed by

subsequent legislation, viz., the Former Enemy Aliens (Disabilities Removal) Act, 1925, which was passed as a preliminary to the ratification of the Anglo-German Commercial Treaty. The Registration of Business Names Act, 1916, and the Companies (Particulars as to Directors) Act, 1917, contain certain requirements which must be complied with by all aliens, but they do not in any way prevent aliens from carrying on any kind of business or employment which may legally be carried on by British subjects. The only provisions which restrict the employment of aliens in the United Kingdom are contained in the Aliens Restriction Acts of 1914 and 1919 and in the Aliens Order, 1920, made thereunder. Under the Act of 1919, an alien may not be employed in certain capacities in merchant and fishing vessels registered in the United Kingdom (other than vessels trading entirely abroad), nor may he hold a pilotage certificate; while the entry of aliens and their supervision while in the United Kingdom are regulated under the Aliens Order. The majority of the provisions of the Order are not directly concerned with industry or business and need not be referred to in detail; but the provisions regulating the admission of aliens may be briefly described.

Every alien who wishes to enter the country must obtain leave to land from an immigration officer at the port of arrival, and has to satisfy the immigration officer as to his reasons for coming to the United Kingdom before leave to land is granted. If the alien's object is to carry on business, either alone or in partnership, his qualifications for carrying on the proposed business, the genuineness of his intention to do so, and the probability or otherwise that he can engage in it successfully, will be among the considerations to be taken into account in deciding whether he should be admitted; but the fact that an alien intends to engage in business or industry is not in itself a reason for refusing him admission, nor for limiting the length of his stay.

On the other hand, aliens whose object is to enter the service of an employer in the United Kingdom are not allowed to land unless they produce a permit in writing for their engagement, issued to the employer by the Ministry of Labour. In dealing with such cases the Ministry has regard, among other things, to the state of employment in the trade or industry for which the alien is required, and must be satisfied that every possible effort has been made by the employer to find suitable labour in this country. Regard is also had to the rate of wages to be paid to the alien, the principle being that these must not be less than the wages usually received by British employees for similar work. Consideration is given to the advantages to British trade and industry of the entry of an alien whose work may set in motion other work on which British subjects could be employed; and to the opportunities afforded in other countries to British subjects of obtaining employment of the kind for which the alien is required in this country. A limited number of permits has been granted to aliens to assist in setting up new industries in this

country (e.g., artificial silk and beet sugar), or to carry on trades, such as Italian mosaic work, which have in the past been undertaken chiefly by foreign workpeople. The permits were for limited periods and subject to the condition that the aliens were employed to train British subjects in the new processes.

The following tables show, as regards applications in respect of aliens desiring to enter for the purpose of employment :—

(*a*) The total number of permits applied for and the numbers granted or refused during the five years 1921–25 ;

(*b*) the numbers of permits granted and refused during the year 1925, classified according to the principal occupations concerned.

Permits granted and refused during the years 1921–25.

Period.	Number of aliens for whom permits were asked.	Permits granted.	Permits refused.
2 Jan., 1921, to 24 Dec., 1921 ..	3,919	2,827	1,092
25 Dec., 1921, to 29 Dec., 1922 ..	3,709	2,555	1,154
30 Dec., 1922, to 28 Dec., 1923 ..	4,917	3,144	1,773
29 Dec., 1923, to 31 Dec., 1924 ..	5,085	3,875	1,210
1 Jan., 1925, to 31 Dec., 1925 ..	6,453	5,349	1,104

The classification of the permits granted and refused in the year 1925 was as follows :—

Classes of Labour.	Granted.	Refused.
Domestic Servants and Nurses	1,540	415
Theatrical, Vaudeville and Concert Artistes, etc. ..	1,816	120
Foreign Correspondence Clerks and Volunteer Commercial Students	580	128
Engineers to erect and repair imported machinery ..	185	12
Beet Sugar Industry (machinery erectors and specialised operatives)	316	1
Hotel and Restaurant Employees	187	67
Teachers of Foreign Languages	328	15
Miscellaneous	397	346
Total	5,349	1,104

It will be seen that the two categories of domestic servants and actors, etc., accounted for about three-fifths of the aliens for whom permits were granted. The case was the same in previous years, for of the 3,144 and 3,875 permits granted in 1923 and 1924, the numbers granted in respect of domestic servants were 1,025 and 1,230 respectively ; and in respect of actors, etc., 912 and 1,034 respectively.

Marking of Imported Goods.

Prior to the passing of the Merchandise Marks Act, 1926, which became law on December 15th, 1926, the law on this subject was that embodied in the Merchandise Marks Act, 1887, which deals generally with fraudulent marks on merchandise. The Act of 1887, which is still in force, prohibits the importation of all goods which, if sold, would be liable to forfeiture under the Act (as explained below), and also all goods of foreign manufacture bearing any name or trade mark being, or purporting to be, the name or trade mark of any manufacturer, dealer or trader in the United Kingdom, unless such name or trade mark is accompanied by a definite indication of the country in which the goods were made or produced. The principal classes of goods which, if sold, are liable to forfeiture under the Act are goods bearing forged trade marks or trade marks which are false or calculated to deceive, or false trade descriptions. The expression trade description includes any description, statement or other indication direct or indirect as to the material, quantity, measure or weight, etc., of goods, or as to the place or country of manufacture or production. The Act also applies to goods bearing marks indicating that they are the manufacture or merchandise of some person other than the person whose manufacture or merchandise they really are.

The following statistics as to the number of consignments of imported goods detained by the Customs under the Merchandise Marks Act during the years 1921 to 1926 are extracted from the Annual Reports of the Commissioners of H.M. Customs and Excise :—

Year ended 31st March.	Consignments detained.			Disposal.				
				Delivered.			Exported or Returned to Port of Shipment.	Seized.
	At the Ports.	In the Parcel Post.	Total.	As British returned Goods.	On Removal or Qualification of Marks.	As Imported.		
1921	1,750	297	2,047	172	1,161	478	181	55
1922	1,551	444	1,995	124	1,172	419	249	31
1923	1,775	667	2,442	125	1,472	487	325	33
1924	1,875	701	2,576	140	1,431	583	385	37
1925	2,400	535	2,935	141	1,622	823	326	23
1926	3,198	927	4,125	180	2,099	1,496	318	32

The Merchandise Marks Act, 1926, entails a radical modification of the law in regard to the marking of imported goods. Section 1 provides that "it shall not be lawful to sell, expose for sale, or, by way of advertising goods of some other kind, distribute in the United Kingdom any imported goods to which there is applied any

name or trade mark being, or purporting to be, the name or trade mark of any manufacturer, dealer or trader, or the name of any place or district in the United Kingdom unless the name or trade mark is accompanied by an indication of origin." The Section thus not only brings the law in relation to the sale of imported goods within the United Kingdom into line with the provision of the Act of 1887 referred to above, requiring the name or trade mark of any manufacturer, dealer or trader in the United Kingdom to be accompanied by an indication of origin, but especially in the matter of distributing goods by way of advertisement, extends the statutory provisions of that Act.

Section 2 of the new Act gives power to make an Order in Council requiring imported goods of any class or description to be marked with an indication of origin on sale or exposure for sale in the United Kingdom, unless it appears to the Government Department concerned that the trade of the United Kingdom or the trade generally of other parts of His Majesty's Dominions with the United Kingdom would be prejudiced thereby. The Section further provides that an Order in Council may require imported goods to bear an indication of origin at the time of importation, unless the Department, having regard to all the circumstances of the case, including the re-export trade of the United Kingdom in that class or description of goods, considers such action undesirable. No order in Council can be made until after a public enquiry has been held in accordance with the provisions of the Act by a Standing Committee to be set up under it. The Committee are bound to hear persons representing such interests as may appear to them to be substantially affected, and the goods made subject to any Order must be goods to which the Committee consider it practically possible to apply an indication of origin effectively and without injury to the goods. No Order in Council can be made until it has lain before Parliament for a period of twenty days while each House is sitting ; and an interval of not less than three months must elapse between the date of the making of the Order and the date on which it comes into force.

The Act contains provisions enabling the Department concerned to give provisional exemptions from Orders in certain cases, and also to exempt particular classes or descriptions of goods from the general requirements of the first Section.

NEW INTERNATIONAL PROVISIONS AS TO THE MARKING OF GOODS

The questions of the false marking of goods and of " unfair " (i.e. fraudulent) competition in trade received considerable attention at the meeting of the International Union for the Protection of Industrial Property, held at the Hague in October, 1925. For some time prior to the meeting the Economic Committee of the League of Nations had been examining these matters, and had prepared an important list of proposed amendments of the Industrial Property

Convention of 1911, which in due course received the approval of the League. These amendments were tabled for discussion at the Hague by the British Delegation to that Conference, and resulted in substantial amendments of the Industrial Property Convention, more especially in Article 6, dealing with the registration of trade marks, and in Article 10bis, relating to unfair competition.

Extracts from the text of these Articles, as they appear in the amended Convention of 1925, are as follows :—

Article 6.

Every trade mark duly registered in the country of origin shall be admitted for deposit and protected in its original form in the other countries of the Union.

Nevertheless, registration of the following may be refused or cancelled :—

1. Marks which are of such a nature as to infringe rights acquired by third parties in the country where protection is claimed.

2. Marks which have no distinctive character, or which consist exclusively of signs or indications which serve in trade to designate the kind, quality, quantity, destination, value, place of origin of the goods or date of production, or which have become customary in the current language, or in the *bona fide* and recognised customs of the trade of the country where protection is claimed . . . . .

3. Marks which are contrary to morality or public order.

* * * *

* * * *

Article 6bis.

The contracting countries undertake to refuse or to cancel, either administratively if their legislation so permits, or at the request of an interested party, the registration of any trade mark which is a reproduction of or an imitation capable of creating confusion with a mark considered by the competent authority of the country of registration to be well-known in that country as being already the mark of a person within the jurisdiction of another contracting country, and utilised for the same or similar classes of goods * * * * *

Article 6ter.

The contracting countries agree to refuse or to cancel the registration, and to prohibit by appropriate measures the utilisation, without authorisation by the competent authorities, either as trade marks, or as elements of trade marks, of armorial bearings, flags and other State emblems of the contracting countries, official signs and hall-marks indicating control or warranty adopted by them, and all imitations thereof from an heraldic point of view.

The prohibition of the utilisation of official signs and hall-marks of control or warranty shall apply solely in cases where the marks which contain them are intended to be utilised for the same or similar classes of goods * * * * *

Article 10bis.

The contracting countries are bound to assure to persons entitled to the benefits of the Union an effective protection against unfair competition.

Every act of competition contrary to honest practices in industrial or commercial matters constitutes an act of unfair competition.

The following acts among others shall be prohibited :—

(1) All manner of acts, of such a nature as to create confusion by any means whatsoever with the goods of a competitor ;

(2) False allegations, in the course of trade, of such a nature as to discredit the goods of a competitor.

Article 10ter.

The contracting countries undertake to assure to persons within the jurisdiction of other countries of the Union appropriate legal remedies to repress effectively all acts referred to in Article . . . . 10bis.

They undertake, further, to provide measures to permit syndicates and associations which represent industries or trades interested, and of which the existence is not contrary to the laws of their country, to take proceedings in the Courts or before the administrative authorities with a view to securing repression of the acts referred to in Article . . . . 10bis, so far as the law of the country in which protection is claimed permits such action to the syndicates and associations of that country.

Of the above extracts, Article 6 and the first paragraph of Article 10bis appear in the Industrial Property Convention of 1911. Articles 6bis, 6ter, 10ter and the 2nd and 3rd paragraphs of Article 10bis were added at The Hague Conference. The following comments on these additions may be made.

Registration of Trade Marks.

Article 6bis contains a valuable provision for the protection of owners of well-known trade marks, and it is hoped that it will be particularly helpful to British traders, who, on opening up a new country for trade, find that their old-established marks have been registered in such country by agents or others desiring to trade upon the reputation of British goods.

Article 6ter represents an important step in the direction of suppressing the unfair and misleading use as trade marks of State emblems, hall-marks, etc.

Unfair Competition.

The second paragraph added to Article 10bis defines unfair competition in general terms, while the third paragraph specifically mentions two forms of unfair competition which are amongst those to be prohibited, viz. (1) all acts liable to create confusion with the goods of a competitor, and (2) false allegations in the course of trade which may discredit the goods of a competitor.

Article 10ter obliges the Contracting Countries to provide appropriate legal remedies to repress effectively all the acts of unfair competition contemplated by Article 10bis. Further, associations representing trades or industries are to be permitted to initiate the necessary legal proceedings so far as the national law permits such action to its own trade associations.

These provisions represent a considerable advance in international obligations to suppress unfair competition.

The Convention signed at the Hague must be ratified not later than 1st May, 1928, and it will come into force, between the countries that have ratified it, one month after that date. If, however, it has been ratified by at least six countries before that date, it will come into force, between those countries, one month after the sixth ratification has been notified.

Note.—Further information relative to the Hague Conference will be found in "Papers and Correspondence relating to the Recent Conference of the International Union for the Protection of Industrial Property, 1925," published by His Majesty's Stationery Office, price 4*s.* net.

ANNEX A.

Anti-Bounty Legislation Abroad.

The following statement quotes the legislative provisions for imposing an extra duty on "bounty-fed" goods (or otherwise countervailing the effect of bounties) in the United States, Belgium, France, Japan, Portugal, Spain and Switzerland (among foreign countries) and in New Zealand and the Union of South Africa (among the Dominions). In all these cases specific reference is made to bounties, but it is possible that in other countries the Government possess powers of a similar nature under more general legislation.* It may be mentioned also that Australia can impose "freight-dumping" duties to countervail the effect of freights reduced by way of subsidy. It will be observed that, with the exception of the United States and Portugal, the legislation empowers, but does not require, the Government to impose a countervailing duty. Only in the case of the United States and Portugal is the provision mandatory.† This may account for the fact that, so far as is known, anti-bounty duties are not applied in practice except in the United States. In that country, there have been several cases of the application of anti-bounty duties.

Prior to the 1922 Tariff Act quoted below, the American anti-bounty duties were limited to cases of export bounties (direct or indirect) granted by Government, but the 1922 Act extended them to cover official or unofficial bounties on export, manufacture or production. Recent cases of the imposition of anti-bounty duties have been :

(*a*) On Australian jam, canned fruits, jelly crystals, condensed milk and confectionery. An export bounty is granted on the sugar content of such products, and the United States anti-bounty duty is exactly equal to the export bounty.

(*b*) On Australian fencing wire, galvanised sheets, traction engines and wire netting. A bounty is given on the manufacture of these goods in Australia, and the United States duty equals the bounty as set out in the Australian Iron and Steel Products Bounty Act of 1922.

* Compare, for example, the following provision of a Czecho-slovak Law of October, 1925 :—"If, as a result of special public or other measures, such as the granting of export or other facilities, the introduction of longer working hours or other more unfavourable social and working conditions, etc., or as a result of fall in the currency, goods imported into Czecho-slovakia from another country enter into exceptional competition with local products, proper protective measures may be taken by a Government Decree, such as the placing of a special customs duty or additional customs duty on the goods in question."

† This should be qualified by a reference to the provision in Item 43 of the South African Customs Tariff, which requires an additional duty (equal to the amount of the bounty) to be levied on imported sugar upon which bounty is granted in the country of origin. Possibly other early laws regarding sugar-bounty countervailing duties may still be in force, e.g. the Indian Laws of 1899 and 1902.

(*c*) On South African slaughter cattle and beef. An export bounty is granted by the Beef Export Bounties Act, 1923, and the United States duty equals the bounty set out in that Act.

In all these cases, the anti-bounty duty applies only to articles directly bounty-fed, but a decision by the United States Treasury in April, 1926, provided that an anti-bounty duty was to be levied on pig iron shipped from India by the Tata Iron and Steel Co., on the ground that the bounty paid to that company by the Indian Government in respect of steel ingots (which are not exported to the United States) constituted an indirect bounty on pig iron smelted by them.

Text of Legislation.

(1) *United States of America.*

That whenever any country, dependency, colony, province or other political subdivision of government, person, partnership, association, cartel, or corporation shall pay or bestow, directly or indirectly, any bounty or grant upon the manufacture or production or export of any article or merchandise manufactured or produced in such country, dependency, colony, province, or other political subdivision of government, and such article or merchandise is dutiable under the provisions of this Act, then upon the importation of any such article or merchandise into the United States, whether the same shall be imported directly from the country of production or otherwise, and whether such article or merchandise is imported in the same condition as when exported from the country of production or has been changed in condition by remanufacture or otherwise, there shall be levied and paid, in all such cases, in addition to the duties otherwise imposed by this Act, an additional duty equal to the net amount of such bounty or grant, however the same be paid or bestowed. The net amount of all such bounties or grants shall be from time to time ascertained, determined, and declared by the Secretary of the Treasury, who shall make all needful regulations for the identification of such articles and merchandise and for the assessment and collection of such additional duties. (Section 303 of the Tariff Act of 1922.)

(2) *Belgium.*

The Government, on the advice of the Council of Ministers, is authorised to levy on the importation of goods which enjoy a direct or indirect bounty on export in the country from which they come or in which they originate, a compensatory duty equal to the bounty. (Article 5 of the Tariff Law of 8th May, 1924.)

(3) *France.*

The Government may . . . . . levy on goods, whether dutiable or not, which enjoy a direct or indirect bounty on export in the country from which they come or in which they originate, a compensatory duty equal to the bounty. (Article 3 of the Tariff Law of 29th March, 1910.)

(4) *Japan.*

In respect of articles on which an export bounty is granted in foreign countries, a Customs duty of the same amount as the said bounty may be imposed by Imperial Ordinance, in addition to the duty prescribed in the Tariff. (Article V. of the Customs Tariff Law.)

(5) *Portugal.*

When the Government is satisfied that any article, whether liable to import duty or not, enjoys in the country of origin or shipment any direct or indirect export bounty, or is characterised by any other form of dumping, the Customs shall levy, in addition to the ordinary duty, a charge equivalent to the premium enjoyed by such article (Article 7 of Customs Tariff Decree of 1923, issued under Law of 1922.)

(6) *Spain.*

The Government is authorised to impose a surcharge on goods which enjoy an export bounty in the country of production. (Base 6 (1) of the Law of Bases of 20th March, 1906.)

(7) *Switzerland.*

In general, the Federal Council is authorised, in cases where any measures adopted in a foreign country are of a nature to interfere with Swiss trade, and also in cases where the effects of Swiss Customs duties are paralysed by export bounties or similar favours, to take such steps as they deem fit in the circumstances. (From Article 4 of Tariff Law of 10th October, 1902.)

(8) *New Zealand.*

In any of the cases hereinafter specified in this section there may, in addition to any other duties of Customs, be imposed on goods imported into New Zealand a special duty of Customs (herein referred to as a dumping duty) ;

* * * * * * *

(*c*) In the case of goods imported into New Zealand of a class or kind produced in New Zealand, or in the case of goods of a class or kind produced in some other part of the British Dominions and imported from a country not being part of the British Dominions, if the Minister is satisfied that any special concession (whether by way of railway or shipping freight, subsidy, special bounty, rebate or otherwise) has been or is to be allowed, taken or granted, and if such concession will, in the opinion of the Minister have an effect prejudicial or injurious to any industry or business established or carried on in New Zealand, or in such other part of the British Dominions as aforesaid. For the purposes of this Section the determination by the Minister of the amount of any such concession shall be final.

* * * * * * * *

The rate or amount of dumping duty levied under this Section shall be determined as follows :—

(*c*) In the case of goods to which paragraph (*c*) applies, the dumping duty shall be an amount to be determined by the Minister not exceeding the amount of the special concession referred to in the said paragraph. (From Section 11 of the Customs Amendment Act, 1921.)

(9) *Union of South Africa.*

When a bounty is granted in the country of origin on any goods of a class or kind made or produced in the Union, an additional customs duty equal to the amount of such bounty may be charged, levied and collected upon the importation of those goods into the Union. (Section 12 (2) of the Customs and Excise Amendment Act of 1923.)

ANNEX B.

"Buy British Goods" campaign.

With a view to inculcating on the public the practice of buying British goods, arrangements were made in July 1925, and have continued since, under which letters passing through the post in London and the principal provincial centres are post marked with the legend "British Goods are Best." Moreover, in October 1925

the President of the Board of Trade and the Minister of Health issued a joint letter to Lord Mayors, Mayors, and Chairmen of Rural and Urban District Councils in England and Wales asking them to consider whether it would be possible to organise in their districts a "British Shopping Week" before Christmas. A copy of this letter is appended. A circular in identical terms signed by the President of the Board of Trade and the Secretary for Scotland was also sent to all Local Authorities in Scotland. Although in many cases it was not possible to arrange British Shopping Weeks at Christmas time, the idea of a British Shopping Week having the objects expressed in the circular letter received cordial support, and on the initiative of local authorities and local trade associations many were held throughout the country during 1926.

Copy of Letter.

Dear Sir,

All in the country are anxious to do what lies within their power to improve British trade and to help employment.

It will be generally agreed that there is an obvious way in which the men and women of this country can help individually. By buying British goods, they will stimulate production, give employment, and, by enlarging the output of our factories, enable them to produce more cheaply and compete more effectively. By increasing their purchases of British goods in the Home market they will reduce the volume of foreign imports and improve the trade balance, thereby enabling this country to invest more in the development of new markets. By increasing the purchases of Empire goods in the Home market, they will enable the countries of the British Empire to buy more from the Mother Country.

Every man and woman in Britain can help in these ways. Every purchase helps; and if all join in a common effort, the stimulus to British trade, Home and Imperial, will be great and immediate. In many quarters people have already shown that they appreciate the need and the possibilities. But there can be no doubt that a national movement to help British trade by buying British goods will be greatly quickened if a suitable occasion is taken which will focus attention at once upon the need and the opportunity for meeting it.

Such an occasion offers itself as the Christmas season approaches. We, therefore, venture to ask you to consider whether it will be possible to organise in your District a British Shopping Week before Christmas. If a Shopping Week, devoted particularly to a display of British Home and Empire products, could be held in the cities and towns of this country, it would afford to their inhabitants an opportunity of helping the trade and employment of this country which would appeal to the British people, and of which we believe they would be eager to take advantage.

Should you decide to give favourable consideration to our proposal we would venture further to suggest that you should communicate with your local Chamber of Commerce or any similar bodies which may exist in your locality and obtain their co-operation.

Yours faithfully,

28th October, 1925. (Signed) P. CUNLIFFE-LISTER.
NEVILLE CHAMBERLAIN.

ANNEX C.

Trade Facilities Acts, 1921–26.

TABLE I.

PARTICULARS OF GUARANTEES SANCTIONED UNDER THE TRADE FACILITIES ACTS, 1921-26 UP TO 30TH JUNE, 1926.

(a) Public Utility Undertakings, £27,437,100.

Purpose of Guaranteed Loan.	Amount.	Period (Years).	
		Average.	Range.
(a) Domestic.	£		
Extensions and improvements of electric railways, works, rolling stock, etc.	12,583,000	50	50
Hydro-electric scheme, erection and equipment of power stations, electrical works supply, mains, plant, etc.	4,122,100	23⅓	20–30
Docks, quays and harbour extensions and improvements.	822,000	19	3–30
Construction of reservoirs and water mains, and extension of water supply.	215,000	27½	25–30
Drainage and disposal scheme	160,000	—	25
Improvement of river navigation	125,000	28½	27–30
TOTAL PUBLIC UTILITY UNDERTAKINGS (DOMESTIC)	18,027,100		
(b) Empire.			
Purchase of materials, machinery, etc., in connexion with hydro-electric schemes, electrical works, etc.	2,750,000	25	25
Construction of railways and provision of rolling stock.	2,040,000	25	20–30
Purchase of plant, etc., to increase dock facilities.	500,000	—	20
Construction of bridge and improvement of other public services.	400,000	—	30
TOTAL PUBLIC UTILITY UNDERTAKINGS (EMPIRE)	5,690,000		
(c) Foreign.			
Purchase of machinery and materials for extension of electricity supply, electric tramways, railways, etc.	3,380,000	18¼	10–23
Purchase of materials for construction of waterworks.	200,000	—	25
Purchase of materials for railway construction.	130,000	—	10
Purchase of materials for improvement of river navigation.	10,000	—	2
TOTAL PUBLIC UTILITY UNDERTAKINGS (FOREIGN)	£3,720,000		

(b) Industrial Undertakings, £18,100,095.

Purpose of Guaranteed Loan.	Amount.	Period (Years).
(a) Domestic.	£	
Coal-mining—		
Pearson and Dorman Long, Limited (Kent Coalfields).	2,000,000	30
Stanton Ironworks Co., Ltd. (including colliery cottage construction).	1,000,000	20
Stafford Coal and Iron Co., Ltd.	131,000	20
Total, coal-mining	£3,131,000	
Tin-mining—		
Dolcoath Mine, Limited	65,000	8
South Crofty, Limited	30,000	3
Lanner Syndicate, Limited	25,000	5
Levant Tin Mines, Limited	10,000	3
Total, tin-mining	130,000	
Lead—		
Wheal Jewell and Marytavy Mines, Ltd.	10,000	5
Iron and Steel, and other Metals—		
Wellman Smith Owen Engineering Corporation, Ltd	70,000	10
Sheffield Steel Products, Limited	16,000	5
Appleby Iron Co., Limited	650,000	30
Prothero Steel Tube Co., Ltd.	20,000	10
North British Aluminium Co., Ltd.	2,500,000	30
Total, iron and steel and other metals ..	3,256,000	
Engineering—		
W. H. Allen, Sons & Co., Ltd.	48,550	15
John Kincaid, & Co., Ltd.	40,000	9½
P. D. Mitchell, Ltd.	60,000	7
Total, engineering	148,550	
Shipbuilding (and Ship-repairing) facilities—		
Harland and Wolff Limited	1,493,345	10
Palmers (Swansea) Dry Dock Co., Limited ..	300,000	30
Total, shipbuilding, etc., facilities	1,793,345	
Textiles—		
Standfast Dyers and Printers, Limited . ..	90,000	10
Seedhill Finishing Co., Limited	25,000	15
Raysheen, Limited	85,000	10
Total, textiles .	200,000	

Purpose of Guaranteed Loan.	Amount.	Period (Years).
(*a*) *Domestic*—contd.		
Chemical—		
Synthetic Ammonia and Nitrates, Ltd.	2,000,000	20
Sugar Beet—		
Anglo-Scottish Beet Sugar Corporation, Ltd.	370,000	12
West Midland Sugar Co., Ltd.	150,000	15
Orchard Sugar Co., Limited	80,000	15
Second Anglo-Scottish Beet Sugar Corporation, Limited.	865,000	10
Central Sugar Co., Limited	185,000	9
Total, sugar beet	1,650,000	
Bacon—		
Four Counties Bacon Factory, Ltd.	12,000	12
Cement—		
Dunstable Portland Cement Co., Ltd.	100,000	10
Eastwood Cement, Ltd.	75,000	10
Total, cement	175,000	
Bricks and Fireclay—		
Holbrook Brick & Tile Co., Ltd.	4,700	4
Leeds Fireclay Co., Ltd.	35,000	7
Upton Colliery Co., Ltd.	14,000	7
B. Whitaker & Sons (1923), Ltd.	60,000	15
Total, bricks and fireclay	113,700	
Paper and Boxes—		
Merton Board Mill, Ltd.	100,000	10
Cropper & Co., Ltd.	100,000	10
Total, paper and boxes	200,000	
Glass—		
James Powell & Sons (Whitefriars), Ltd.	63,000	10
Pickerdite & Co., Ltd.	17,500	10
Triplex Safety Glass Co., Ltd.	40,000	5
Total, glass	120,500	
Rubber—		
North British Rubber Co., Ltd.	50,000	6
Housing. (Additional to item included under coal-mining.)		
Llantrisant and Rhymney Valley Housing Co., Ltd.	100,000	30
Butterley Housing Co., Ltd.	304,500	30
Total, housing	404,500	

Purpose of Guaranteed Loan.	Amount.	Period (Years).
(*a*) *Domestic*—contd.		
Quarries—		
Leckhampton Quarries Co., Ltd. (for construction of railway from quarries and erection of lime kilns).	50,000	25
Leckhampton Quarries Co., Ltd. (erection of further plant at quarries).	27,500	25
,, ,, ,, ,,	23,000	22
Total, quarries	100,500	
Miscellaneous—		
Beardmore Taxicabs, Ltd.	350,000	10
Midland Marts, Ltd.	10,000	10
Total, miscellaneous	360,000	
TOTAL, INDUSTRIAL UNDERTAKINGS (DOMESTIC)	13,855,095	
(*b*) *Empire*.		
Pulp and Paper—		
Newfoundland Power and Paper Co., Ltd. ..	2,000,000	25
Wayagamack News, Ltd.	425,000	15
Total, pulp and paper	2,425,000	
Sugar—		
Jamaica Sugar Estates, Ltd.	115,000	13
,, ,, ,, ...	20,000	12
Doornkop Sugar Estates, Ltd.	70,000	5
Total, sugar	205,000	
TOTAL, INDUSTRIAL UNDERTAKINGS (EMPIRE)	2,630,000	
(*c*) *Foreign*.		
Tin—		
Malayan Tin Dredging, Ltd.	100,000	7
,, ,, ,, ...	150,000	6
Southern Perak Dredging, Ltd.	75,000	6
Petaling Tin, Ltd.	80,000	5½
Total, tin	405,000	
Railways—		
African Railway Finance Co., Limited	1,150,000	25
Textiles—		
Anglo-Hungarian Spinning Co., Limited	60,000	9
TOTAL, INDUSTRIAL UNDERTAKINGS (FOREIGN)	£1,615,000	

(c) Shipping, £19,396,085.

	Amount.	Period (Years).	
		Average.	Range.
(*a*) Domestic.			
Construction or completion of vessels ..	£ 17,319,419	10¼	1–20
(*b*) Empire.			
Nil.			
(*c*) Foreign.			
Construction or completion of vessels ..	2,076,666	7¾	5–10

Total of guarantees to 30th June, 1926, £64,933,280.

TABLE II.

STATEMENT OF AMOUNTS PAYABLE UNDER THE UNDERTAKINGS GIVEN UNDER SECTION 2 OF THE TRADE FACILITIES ACT, 1924, UP TO 30TH JUNE, 1926.

Name of Government.	Amount payable annually.	Total period (Years).	Purpose of Loans.
	£ s. d.		
Sudan Government*	4,875 0 0	4	Purchase of railway materials.
Government of Newfoundland	5,836 19 9	5	,, ,, ,,
Government of Western Australia.*	7,461 14 8	5	Purchase of a new ship.

* The amounts payable in these cases are subject to adjustment.

ANNEX D.

Safeguarding of Industries Act, 1921.

1. POSITION AND PROGRESS OF KEY INDUSTRIES.

(*Summary of Report* (*Cmd.* 2631) *dated March*, 1926).

Optical Glass, Optical Elements and Optical Instruments.

Optical instruments and the optical glass and elements required for their manufacture are of vital importance not only for the Fighting Services, but also for medical, physical, chemical, astronomical and other research, for the regulation of industrial processes, for nautical and aerial navigation, surveying purposes, and for general laboratory and educational requirements.

The *optical glass* required by the manufacturers of optical instruments in this country was imported in pre-war days to the extent of approximately 90 *per cent.* from Germany and France; but despite adverse industrial conditions in the post-war period, the three firms who now make optical glass in this country produce nearly 100 varieties of glass compared with only

26 varieties made here in 1914.* The glass is of high quality and unsurpassed in respect of many of the varieties by that of any other makers in the world. For some types of optical glass, the prices during 1925 were approximately 50 *per cent.* under those of 1921 ; and the prices of some varieties were later reduced to a point less than 50 per cent. above the pre-war level.

With regard to *optical elements* (i.e. such articles as lenses, reflectors and prisms made of optical glass or mineral substances), and *optical instruments*, the Committee found that the pre-war British industry, though small, was efficient, and in respect of some articles it occupied the premier world position. Its weakness lay primarily in its small scale of production of each class of optical element and instrument. Since then very considerable developments have taken place as the result of research work (done both by individual firms and also by the British Scientific Instrument Research Association), and expenditure on improved plant, machinery and tools. Many new types of lenses have been produced, and the quality and range of British lenses for all branches of photography appear to be superior to the best offered by foreign firms. New apochromatic microscope objectives superior to any made abroad have been put on the market by British makers, and accuracy of focussing and rigidity have been secured on British microscope stands to a degree unequalled elsewhere. The slight pre-war advantage of the German manufacturer of binoculars has been reversed. The reputation of British optical instrument makers is very high, and instruments for dealing with special branches of research have been supplied to all parts of the world. A special new apparatus for testing lenses which has been evolved, promises to revolutionise this branch of the industry ; and a new refractometer for testing optical glass is ahead of anything produced abroad. The Admiralty, War Office and Air Ministry, who are the largest users of optical instruments in the country, are satisfied that British instruments are capable of meeting their most exacting demands.

As regards cost and price, the Committee considered that every reasonable effort had been made in post-war years to reduce costs of production to a level at which progress might be possible, or at least the position of the industry maintained. The prices of one of the foremost firms in the industry had been reduced from 100 per cent. above the pre-war level in 1921 to from 30 to 60 per cent. above that level at the time of the Committee's report. Owing, however, to the depreciation of the French franc, the import values of French productions were stated to be little more than one-half of the corresponding pre-war figures ; and, notwithstanding the stabilisation of the mark, the prices of the better-known German optical instruments were found to be still somewhat below the pre-war values.

The German industry had from pre-war days been ahead of that in this country largely owing to an assured home market for its products, consequent on the existence of a large standing army and also on the much wider degree of the application of science to industry in Germany. German manufacturers had thus been able to introduce mass production methods and to reduce overhead charges, and could thereby undersell British instruments, both in foreign markets and also, at least apart from the duty, in the British market as well. The Committee mentioned further that this advantage promised to be greater in the future owing to an agreement between the leading German optical firms aiming at reducing costs of production at practically all stages of manufacture.

* As many as 200 varieties were listed by one Continental maker in pre-war days, although the larger portion were probably made only to special order. The two figures given for British production refer to varieties normally in stock.

The industry in this country had, the Committee found, been handicapped not only by large imports of cheap foreign instruments due to depreciated exchanges and low wages, but also by the fact that the component parts of optical instruments were not all dutiable, and instruments could, therefore, be made in this country by the assembly of such parts on which no duty had been paid. The existence of large stocks of instruments produced for war purposes, decreased orders from the Fighting Services, and foreign tariffs, had all had a prejudicial effect. The industry had also suffered heavy losses in connection with the production of some of its new products, e.g. high-class lenses for certain branches of photography, as these are used only in small numbers; though it was believed that the British manufacturers, who had installed the most modern labour-saving machinery, would, under equal conditions of wages and with normal exchanges, have been able to hold their own.

The Committee found that the decrease in labour employed in the optical glass and instrument industries was very material compared with the pre-war position, the number of operatives employed at the time of their report, namely, about 1,200, being estimated at about 60 per cent. of those employed in 1913. In 1921, 78 per cent. of the pre-war numbers had been employed. While the decrease might be due in a small measure to the installation of labour-saving plant, the Committee considered that mainly it reflected the depressed state of the industries under consideration. They added that the number of highly skilled operatives in the industry was still decreasing, and pointed out that the period required for training men for the skilled work involved is so very long that expansion of output is much slower than in other industries.

The Committee were of opinion that the advances in range and quality of products were made during the post-war years proved conclusively that the effect of the safeguarding tariff had been in no way detrimental to progress, but had, on the contrary, been at least helpful in placing the British optical industry ahead of all competitors as regards the quality of many of its productions, although not in respect of the price at which these could in general be marketed. Having regard to the inadequate protection given by the existing rate of duty in respect of many of the articles in question, the Committee recommended that the duty be increased from 33⅓ per cent. to 50 per cent. and that all component parts of instruments which are themselves dutiable should be liable to duty.

Scientific Glassware and Lamp-blown Ware.

Scientific glassware consists in general of furnace-blown ware (which is blown and otherwise fashioned by a highly skilled operative from molten glass taken direct from the furnace) and of lamp-blown ware (which is produced by a skilled operator working at the bench with the aid of a blow-lamp). Many of the articles falling within both types are subsequently calibrated for volumetric purposes.

Scientific glassware, both furnace-made and lamp-blown, is used in the chemical, biological and other laboratories of educational and research institutions and industrial concerns, and prior to 1914 was in the main imported from Germany and Austria. High grade thermometer tubing and a small quantity of medium and higher grade lamp-blown ware were made here. Competition with the imported lower grade lamp-blown ware, largely the product of cottage industry, rendered its production in this country almost out of the question.

The outbreak of war rendered large supplies immediately necessary for the medical services, explosives manufacture, analytical operations in steelworks and researches undertaken for war purposes.

Large importations of foreign glassware followed the removal of restrictions on importation at the end of the year 1919, and continued whilst the Safeguarding of Industries Bill, 1921, was passing through Parliament. In the case of the more common types the Committee reported that quantities estimated at two years' consumption were imported during the few months immediately before the Act came into operation. The industry was thus faced with a very serious reduction in demand, furnaces had to be closed, the cost of expensive idle plant had to be carried, and the firms concerned have only been able to continue manufacture with an annual loss. These difficulties, combined with the collapse of the mark, served to nullify any immediate benefit which might have been expected from the passing of the Act.

The production in quantity of hand-made ware required large numbers of highly skilled workers, such as have been available in Germany for generations owing to the virtual monopoly enjoyed by that country. In the United Kingdom men had to be specially trained for this type of ware. Further, as regards moulded glassware, labour costs are a very high proportion of the whole, and the Committee found that the lower wages and longer hours worked abroad prevented the duty imposed by the Act being an adequate protection.

That section of the industry which manufactures lamp-blown ware has, states the Report, also had considerable difficulty in meeting competition from Germany in the types of ware more particularly which are the products of the Thuringian cottage industry, such as ampoules for medical work, test tubes, and tubes for clinical and other thermometers; nevertheless, this section had just been able to hold its own with the aid of the existing duty.

In general, it was considered that the existing duty had enabled British manufacturers to maintain and even increase their output. To do this it had been necessary for them to improve the efficiency of their methods of manufacture and the quality of their production. In some instances also new types of glass had been evolved.

Evidence made available to the Committee from large users of scientific glassware indicated that British scientific glassware is of high quality, and is unsurpassed by and indeed, surpasses the best foreign makes. No difficulty is experienced in meeting the tests of the National Physical Laboratory for volumetric glassware. Every effort had been made by British manufacturers, the Committee found, to improve the efficiency of their operations so as to enable price reductions to be made to counter foreign competition. For example, the prices of general laboratory glassware of the light furnace type had fallen in 1925 to about two-thirds of those ruling in 1921, and the price of laboratory glass tubing and test tubes had fallen to approximately half the 1921 figure.

Laboratory Porcelain.

Under the term "laboratory porcelain" are included a number of porcelain articles specially manufactured for use in chemical operations. During war, laboratory porcelain is essential in connection with the manufacture of explosives and in the testing of steel and other materials.

In pre-war days Germany was virtually the sole source of supply of the porcelain used in British research laboratories and educational institutions. The shortage consequent on the outbreak of war resulted in a serious effort to manufacture in this country. The difficulties inherent in the manufacture of satisfactory ware had, the Committee reported, proved to be very considerable, a fact which is emphasised by the reflection that German laboratory porcelain required some thirty years to attain its pre-war standard of quality.

Evidence available to the Committee as to the quality of the British laboratory porcelain was somewhat conflicting. It appeared, however, to be clear that British porcelain had not yet in general attained the standard

reached by the best foreign ware, although the best British makes showed, for most ordinary purposes, little inferiority. Sales of British porcelain had declined since 1921, and during the greater part of 1925 very considerably so, though an improvement had been manifested since the last quarter of 1925. Some of the trained operatives had been disbanded, and it was with the utmost difficulty that the industry had been maintained.

The Committee found that, if the laboratory porcelain industry is to be established in this country, continued safeguarding for a further period of years is essential. Unless reasonable financial stability is secured by a satisfactory market for the British ware, adequate expenditure on research directed towards the manufacture of perfect laboratory porcelain would be, they considered, impossible. They advised British manufacturers to co-ordinate their research under a research association in connection with the Department of Scientific and Industrial Research.

Scientific Instruments.

Under the heading "scientific instruments" are included a large number of non-optical instruments essential for naval, military and air force needs in time of war, and of prime importance in every branch of physical, chemical and medical research, both in times of peace and war. Although a limited range and quantity of such instruments were manufactured in this country prior to 1914, British users were largely dependent on foreign supplies, imported from the Continent and from the United States.

The Committee reported that the degree of safeguarding afforded by the Act of 1921 had enabled manufacturers in this country to extend the production of instruments previously made, and very considerably to increase the range of their products. The increase in output of the various makers concerned varied between 20 and 80 per cent. over that of 1921, and would probably have been still greater but for the trade depression.

In respect of mathematical drawing instruments a much larger expansion of output had taken place. Methods of mass production had been initiated, and one large firm of manufacturers produced in the year 1925 approximately four times the number of instruments manufactured in 1921.

Considerable price reductions had, the Committee reported, taken place. Pyrometers, for example, had been reduced by 15 to 20 *per cent.*, other measuring instruments by 33⅓ *per cent.*, recording instruments by 35 per cent., and insulation testing sets by as much as 50 *per cent.* Mathematical drawing instruments also showed considerable reductions varying up to 40 per cent. compared with the price in 1921.

The Committee found that the quality of British instruments is in general very satisfactory, and reported that by reason of their high quality, British mathematical drawing instruments were rapidly displacing foreign instruments, not only in this country, but also in the Dominions.

The general effect of the existing duty on the scientific instrument industry had been, in the Committee's opinion, undoubtedly beneficial. The duty appeared to have turned the scale in favour of the British instrument when the price of the foreign article, together with the duty had been only slightly below the British price. The Committee considered that it would be disastrous if the highly skilled workmen who had been trained in this infant British industry were dispersed in the manner which would almost inevitably follow any general removal at this stage of the safeguarding duty. In the best interests of both pure and applied science, the home industry should be assisted by the maintenance of the duty to attain even greater skill and accuracy in its products than has been possible in the comparatively brief period that it has been established here on its present scale, and thereby ultimately to equal or surpass its competitors.

As in the case of optical instruments, the importation of parts of scientific instruments free of duty had gone far to counteract the beneficial effect of safeguarding the finished instruments. The Committee recommended therefore that component parts of non-optical scientific instruments should also be liable to duty.

Gauges and measuring instruments of precision of the types used in engineering machine shops and viewing rooms.

Gauges are essential in modern engineering works, particularly where mass production of interchangeable parts is carried on. Nevertheless, in 1914, the quantity manufactured here was very small, and reliance was placed on imports from Switzerland, Germany and the United States.

Gauges during the war were supplied, but only after a dangerous loss of time, by intensive production by the most diverse organisations supplemented by importations from friendly and neutral countries. Some of the makers were compelled to close their works at the termination of the war owing to the large stocks of gauges in hand and to considerable foreign competition. After the passing of the Act of 1921, the position appears to have gradually improved, works were re-opened, and from the year 1922 onwards the trade has steadily grown, with an increasing share also in export orders. It was only, however, by means of the duty that British manufacturers had been enabled to obtain business.

The range of variety in gauges made by the British industry now comprises almost all the types normally required, except in the case of micrometer gauges, where the manufacture does not as yet appear to cover every variety. Steps, were, however, being taken, it was reported, to remedy this, and continued support to the industry was considered by the Committee to be essential.

The methods of manufacture devised during the war have been modified and improved, and the degree of accuracy required has been considerably raised. British gauges appear, in general to be of very high quality, and no difficulty is experienced in satisfying the exacting tests of the National Physical Laboratory.

An increasing use of gauges will necessarily follow an increase in mass production methods, especially of standardised machine parts, in the engineering and allied trades, and it appeared to the Committee to be of the greatest importance that this country should not be again dependent on foreign manufacturers for supplies of such fundamental requisites.

Wireless Valves and similar Rectifiers.

As regards valves for wireless receiving purposes, the Committee found that research had been carried on, on an ever increasing scale, and had led to the production of new types of valves and to the production of valves having very special properties for particular work. Speed of manufacture had also been increased by the introduction of new or improved processes. Considerable progress had also been made in the manufacture of transmitting valves since 1921, and the demand for transmitting valves of long life had led to research which had resulted in several types being placed on the market. Extra high tension rectifiers suitable for cable testing and similar operations had also been successfully developed. Unless a continuation of the research work were possible, the British industry would soon, it was stated, be left behind.

The importation of foreign valves had increased between the years 1924 and 1925 by some 250 *per cent.*, and it appeared to the Committee that foreign competition might in the future be a much more serious factor in the valve industry than hitherto. Prices of British valves had, the Report states, fallen to from 35 to 60 *per cent.* of the prices in 1922, according to the type of valve

and other factors, but in spite of such considerable reductions, valves of continental manufacture were on sale in this country at prices from 30 *per cent.* to 70 *per cent.* lower than those charged for similar types of British valves.

In these circumstances the Committee considered that failure to renew the safeguarding duty for a further period of years would very seriously prejudice the continuation of the research work in the industry which is so essential, and they were of opinion that no steps should be taken which would militate against the continued progress of this important industry.

Vacuum Tubes.

Vacuum tubes include, primarily, X-ray tubes, which are of considerable value in scientific research, in medical diagnosis, in surgery and in metallurgical analysis. They have also a large potential field of employment in dentistry and in the research and control department of numerous industries. The manufacture of such tubes in this country was carried on to a small degree prior to the year 1914, and received considerable impetus during the war, but it has declined since the cessation of hostilities. At the time of the Committee's Report there were not more than four or five makers in this country, all of whom, it was understood, had a restricted output. The Committee considered it very desirable that British requirements should be met by manufacture in this country. They accordingly recommended that the safeguarding duty be continued for a further period of years.

Ignition Magnetos.

Ignition magnetos are used primarily on motor vehicles and aircraft. Prior to 1914 very few magnetos were made in this country, and the demand was met almost exclusively by importation from Germany. The huge war demand necessitated manufacture in this country on a large scale. By the Finance (No. 2) Act, 1915, an *ad valorem* duty of 33⅓ *per cent.* was imposed on magnetos for motor cycles and motor cars other than commercial cars and certain other limited exceptions (see p. 399). The duty imposed by the Safeguarding of Industries Act, 1921, was not additional to the former duty, and the effect of the Act of 1921 was, therefore, to place magnetos for all cars and for all types of engine on an equality as regards the rate of duty.

The British industry has increased at a rapid rate since the Act was passed, and returns of sales obtained by the Committee from the leading manufacturers of magnetos indicated an output in the year 1925 several times as large as in 1921. Prices have fallen as output has increased and as internal competition has developed among the British makers, and the average price over the total sales effected in the year 1925 was barely one-half of the corresponding figure in 1921. Information received by the Committee from motor manufacturers indicated that the cost to them as consumers of magnetos had decreased by a less percentage than the makers' total sales suggested. The reduction varied in the case of the different users, up to 51 *per cent.* since October, 1921, but the average of the percentage reductions reported by makers of private cars was 33⅓ *per cent.* and by makers of commercial vehicles 16 *per cent.*

The number of employees in the industry was reported to have almost doubled since the year 1921, and was over 4,500 at the time of the Committee's report.

Strong efforts are being made by the industry, the Committee state, to capture the export market, and exports though small are increasing.

The development of the magneto industry in this country to an extent which now enables it to supply all requirements, has only been made possible by a large expenditure on research. The evidence available to the Committee

pointed to the design of British magnetos being at least equal if not superior to that of any manufactured abroad, and to the general quality being quite as high as that of the best imported magnetos.

The Committee considered that a removal of the safeguarding duty at present would be very harmful to the British magneto industry, and recommended that the protection should be continued until the manufacture of magnetos has established itself still more securely as a permanent British industry.

Permanent Magnets.

Permanent magnets are used in the manufacture of magnetos, telephone receivers, wireless head-phones and loud speakers, and electricity meters and other electrical instruments such as ammeters and voltmeters.

Prior to 1914 British supplies were obtained mainly from Germany and France. The requirements of the war, however, and the subsequent safeguarding duty had, the Committee reported, enabled the British magnet industry to arrive at a condition when it is capable of supplying the whole of the home demand for magnets of the various forms and sizes required. Prices also had fallen very materially since 1921, not only on account of reductions in price of the raw materials, but also owing to the keen competition between the various British makers.

Whilst the export trade in permanent magnets was very small, owing to the collapsed exchanges in certain continental countries, and to the tariff in other foreign markets, the imports were by comparison considerable, and in some branches, the Committee found, seriously affected the output of the British makers. The operation of the duty had enabled British manufacturers to meet competition in the home market in most branches of the magnet industry, but evidence was placed before the Committee which satisfied them that a removal of the duty would result in a very serious setback to the industry.

Arc-Lamp Carbons.

Until the year 1902 the United Kingdom was entirely dependent on foreign sources of supply of arc-lamp carbons. In that year, however, a factory was erected, which after many years of effort and research was finally able to meet all the requirements of the Fighting Services for this commodity. The knowledge and experience thus gained proved of great value at the outbreak of the late war, when the demand for searchlight carbons increased to such an extent that the size of the existing factory had to be at once doubled. Other factories sprang up for the production of arc-lamp carbons to supply war requirements, and at the termination of hostilities it was decided, after very careful consideration, that at least one of the works must be retained in operation.

The consumption of carbons for street lighting has considerably diminished of recent years, and the chief commercial demand is now for cinematograph purposes. The whole peace-time requirements of this country for arc-lamp carbons could be supplied by the existing works, but owing to foreign imports, which have been steadily increasing, the home output has diminished, and the Committee reported that financial loss had become so serious that part of the manufacturing plant had been closed.

The Committee regarded it as of great importance that some effective means should be found to safeguard this industry, and they reported that the Safeguarding of Industries Act appeared to have hitherto afforded little help to it. The foreign manufacturers sell carbons in this country through sole agents, and the average price at which they are imported is so considerably below the figure at which they are sold wholesale to large consumers, that the addition of the 33⅓ *per cent. ad valorem* duty appeared to make little difference in the

ability of the importer very seriously to undersell the British maker. The Committee arrived at the conclusion that the method most likely to be effective was the imposition of a specific duty based on weight, in place of the *ad valorem* duty. They accordingly recommended that a duty of 1*s.* per pound weight should be substituted for the duty imposed by the Act of 1921.

Hosiery Latch Needles.

Hosiery latch needles form an essential part of the knitting machines used for the large scale production of knitted hose, knitted underwear, and other knitted goods, and are consumed in this country to the extent of approximately 50 millions per annum. Although the latch needle was originally a British invention, the United Kingdom was, prior to the year 1914, dependent for the most part on latch needles imported from Germany. The outbreak of war resulted in a large demand for the production of knitted goods for the army, and medium and coarse gauge needles were the main requirement. Since the war considerable expense has been incurred in the endeavour to increase the output, range and quality of British latch needles, and the Committee found that all the requirements of British users of latch needles of all gauges could now be satisfied by the British makers. Foreign competition had nevertheless been responsible for a considerable diminution in the output of latch needles since 1922, notwithstanding that the capacity of the British machines had been considerably increased since that date.

Prices of latch needles had fallen since the safeguarding duty was imposed, for example, from 130*s.* per thousand in September, 1921, to 110*s.* per thousand in September, 1925, for a needle of 48 gauge. The price of the British needle was, the Committee reported, still so far above the figure at which latch needles were being imported into this country from Germany, that competition from that country was very seriously threatening the existence of the home latch needle industry. The rates of wages paid in this industry in Germany appeared to be very much less than in this country, and, as wages, form some 80 per cent. of the cost of production of latch needles, this factor was a very serious one. It appeared, indeed, to the Committee, to be inevitable that the output of British needles must continue to decline unless a rate of duty were imposed which would more nearly compensate for the labour advantage possessed by the foreign manufacturers.

The Committee considered that the duty had had the effect for which it was designed, namely, to keep this key industry in being after the war, and recommended that a duty should be continued. They further recommended that the question of the desirability of increasing the rate of duty so as more nearly to counterbalance the labour advantage possessed by the continental manufacturers should be considered.

Metallic Tungsten, Ferro-Tungsten, and Manufactured Products of Metallic Tungsten.

Tungsten is one of the comparatively rare metals, which has up to the present found somewhat limited, but nevertheless, extremely important applications. The chief ore of the metal is wolfram, large supplies of which are available within the British Empire. It is consumed in the form either of tungsten powder or of its alloy with iron (ferro-tungsten) mainly in the manufacture of high-speed steel used for the construction of machine tools. Tungsten steel has the property of enabling cutting tools constructed from it to retain their cutting edge even at the high temperature which high-speed machine tools attain. This use makes tungsten of great importance in the manufacture of munitions for war purposes and of considerable value in engineering work in normal times. Tungsten steels are also used for the manufacture of permanant magnets and for some other purposes in which specially hard steel is required.

Although the use of tungsten for the manufacture of high speed steel came gradually into use towards the end of the last century, the whole of the world's consumption prior to the year 1914 was obtained from Germany, where alone the ore imported from countries within the British Empire and elsewhere was smelted. Attempts had been made to initiate tungsten manufacture in this country, but had failed in face of severe competition from Germany. The outbreak of war necessitated manufacture on an extensive scale in this country.

A cessation in production followed the termination of the war, but since the year 1922 the total annual production of tungsten and ferro-tungsten by the several British firms now engaged in manufacture, has increased year by year. It has thereby proved possible to manufacture other ferro-alloys also on a commercial basis, and owing to the high quality of the British products even to make sales of these and of ferro-tungsten to the continent in competition with foreign makers. The Committee found that internal competition between the several British makers of ferro-tungsten had prevented the price of the alloy to steel makers rising to any serious extent, and that the current price to home users was still much less than 33⅓ *per cent.* in advance of the price at the end of September, 1921, when the Safeguarding of Industries Act became operative.

Continental methods of production are cheaper and labour is less expensive than is the case in this country. These factors, among others, would have prevented the British makers of tungsten and ferro-tungsten initiating and continuing manufacture after the war in the absence of the protecting duty. Having regard to the great importance of the industry, the Committee were of opinion that the manufacture of tungsten and ferro-tungsten and of products of metallic tungsten should continue to be safeguarded for a further period of years until conditions are more normal and the British industry has become firmly established.

Compounds of Thorium, Cerium and the other rare Earth Metals.

The only extensive commercial source of these compounds within the British Empire is in Travancore, where the raw material, monazite sand, is mined by a British company and imported into this country to be worked up by them into the rare earth compounds. Chief among these are thorium and cerium nitrates employed in the manufacture of incandescent gas mantles, cerium fluoride essential for flame arcs required for searchlight purposes in time of war, and mesothorium used as a radium substitute in the manufacture of luminous compounds for use on gun-sights, recording apparatus on aeroplanes, compasses, and other instruments. In addition thorium compounds are used in the manufacture of certain types of wireless receiving and transmitting valves, and cerium compounds find application as catalysts and oxidising agents in organic chemical reactions, and have some use in medicine.

Before the war Germany had almost a monopoly of the thorium nitrate market, and the industry established in this country during the war had to meet severe German competition at the close of hostilities. That competition was intensified by the depreciation of the mark and the possession of accumulated stocks of thorium residues from war manufactures, which the German manufacturers were able to write down to a merely nominal value and use as their raw material. The passing of the Act of 1921 gave some assistance to the industry, but competition was so severe as to reduce very seriously the manufacture in this country. Experiments, however, directed towards improvement in the efficiency of the British industry yielded results which enabled works closed in the year 1922 to be re-opened at the end of 1923.

The Committee reported that the rare earth industry in this country has now reached a stage of efficiency which would enable it under equal conditions to compete successfully against any foreign makers without assistance. Until such time, however, as the present abnormal conditions on the continent are removed, the safeguarding already afforded would require to be renewed.

Chemicals.

[*All Synthetic Organic Chemicals (other than Synthetic Organic Dyestuffs, Colours and Colouring Matters imported for use as such, and Organic Intermediate Products imported for their manufacture), Analytical Re-agents, all other fine Chemicals (except Sulphate of Quinine of vegetable origin), and Chemicals manufactured by fermentation processes.*]

For a long period of years prior to 1914, the British chemical industry had primarily devoted itself to the manufacture of the heavy chemicals, used, in general, in large quantities for industrial processes, and as a rule not of the highest degree of purity. In this branch of manufacture the United Kingdom was probably, on the whole, ahead of any other nation. Of the so-called "fine" chemicals, however, a very limited number were manufactured in this country and mostly in small quantities. When chemical substances for use in analytical or research work, or for pharmaceutical, photographic or certain less common industrial purposes were required, it was in the main to continental manufacturers that the orders went. The range of British products was very limited, and such fine chemical and other analytical re-agents as were made in this country were not held in such high repute as those of foreign makers.

With regard to synthetic organic chemical compounds,* this country was also far behind the foremost continental manufacturers, and the wide range of synthetic products which came so largely into use in medical and surgical science during the early part of the present century was almost exclusively the output of the continental chemical industry.

The outbreak of the late war made the development in this country of these branches of the chemical industry essential. British chemical manufacturers were called upon to supply in large quantities and in ever-increasing variety, substances not previously manufactured here; for example, important drugs such as aspirin, local anaesthetics such as novocaine, photographic developers and sensitisers indispensable for aerial photography and X-ray work in hospitals, and many others for use in the national crisis.

This was accomplished with a very considerable degree of success, but not without serious delay which would have been avoided if a fine chemical industry comparable in magnitude with that on the continent had existed in this country.

The Committee's review of the sections of the chemical industry now in question appeared to them to prove conclusively that very considerable advances had been made. The safeguarding duty had not had the effect of inclining British manufacturers to be content with the progress made during the period of emergency. The impetus given during the war had been continued since, and the protection afforded by the Act of 1921 had had the effect of placing the British synthetic organic and fine chemical industry on a basis more nearly comparable with that of its keenest competitors than ever before.

Compounds never previously manufactured in this country can now be produced in quantities sufficient not only for all home requirements, but also for a considerable export trade. Existing conditions abroad, however, in many cases seriously reduce the output which would otherwise be possible.

* The position as regards dyestuffs and intermediate products is discussed separately. See pages 416-20.

Metol, for example, formerly a product of the continental chemical industry, can now be made here in ample quantity. When the mark was at its lowest the corresponding German product could be sold here, duty paid, below British costs of production, and the Committee stated that at the time of their Report a similar condition of things obtained with regard to French products. When German manufacturers had a monopoly of metol manufacture in 1913, the price, even to professional photographers, was 21*s.* per lb. Now that the monopoly was broken the British market price had fallen to 9*s.* per lb.

The new industrial research laboratories which have been built since the passing of the Act of 1921, and the investigations which have been pursued, have led to a very large number of similar instances in which a foreign monopoly has been broken. The research prosecuted in the industry has also been directed towards methods of mass production of substances hitherto made in small quantities, towards the economically very important problem of profitable utilisation of the by-products obtained in the manufacture of important chemical compounds, and also in the direction of discovering alternative commercial processes for making the same product which avoid dependence on the same raw material.

The research facilities which the Act of 1921 has made possible have had many valuable applications in the manufacture of products on a commercial basis. In the case of insulin, very careful research was required to make practicable its manufacture on a large scale ; and as research facilities were, owing to the operation of the Act of 1921, at once available, extensive and cheap production was possible in a comparatively brief space of time, as a consequence of which a large proportion of the insulin market of the world has been gained by British manufacturers.

The Committee found that in general every effort had been made to reduce prices ; over a range of between 500 and 600 chemical compounds of the kind now under consideration an average reduction in price between 1920 and 1925 of 47 *per cent.* had taken place. In the case of some 240 compounds information available showed the fall in price between the years 1921 and 1925 to average 42·5 per cent. Individual substances showed even greater reductions.

It appeared, however, that in respect of some fine chemicals it had not yet been possible for British manufacturers to reduce their prices to a level which would enable them to compete with imported products even when the duty was added. Apart from the duty, British products would in general still be undersold. The combination of interests recently formed between the large German chemical firms would, the Committee pointed out, no doubt lead to still further reductions in the cost of manufacture of synthetic organic and fine chemicals in Germany. They were of opinion that the degree of safeguarding afforded by the Act of 1921 is essential to the progress of the industry in this country. Whilst the synthetic organic and fine chemical industry had made great advances since that Act was passed, it had not yet, the Committee found, reached the stage at which it could stand by itself.

The Committee found that employment in that portion of the chemical industry in question had more than doubled since 1913, and at the time of their Report the number of actual chemical workers engaged appeared to be about 3,100. A still greater rate of increase had taken place in the number of trained chemists employed.

It was considered that if the synthetic organic and fine chemical industry were not safeguarded against the foreign competition which it is, as yet, unable to meet unaided, the training ground which is being gradually developed for the skilled scientific workers who would be required in any future national emergency would be taken away.

2. List of Applications referred to Committees under Part II. of the Safeguarding of Industries Act, 1921.

(*Note.*—All the applications had reference to depreciated foreign currency, except where otherwise stated.)

Fabric gloves and glove fabric for the manufacture of fabric gloves.
Domestic, illuminating and mounting glassware.
Wrought enamelled hollow-ware.
Aluminium hollow-ware.
Gas mantles.
Plain and enamelled baths.
Optical elements and optical and other scientific instruments.
Glass bottles (partly with reference to "dumping").
Wire nails.
Toys.
Gold leaf.
Gold and aluminium bronze powders.
Snap fasteners and hooks and eyes.
Vulcanised fibre (with reference to "dumping").

Duties at the rate of 33⅓ per cent. *ad valorem* were imposed on goods of the following descriptions manufactured in Germany :—

Fabric gloves	By Order of the Board of Trade (No. 1 Order) dated August 8th, 1922.
Glove fabric	
Domestic and illuminating glassware	
Domestic hollow-ware (aluminium and enamelled)	
Gas mantles and parts thereof	By Order of the Board of Trade (No. 2 Order) dated October 9th, 1922.

ANNEX E.

Safeguarding of Industries.—New Procedure.

1. Board of Trade Memorandum [Cmd. 2327] dated February, 1925, as to Procedure and Enquiries.

It is the intention of the Government that any duties proposed for the safeguarding of industries shall be imposed for a limited period, and in a Finance Bill in which that period will be prescribed. Duties will only be proposed in a Finance Bill if the Board of Trade are satisfied that a *primâ facie* case for enquiry has been established, a Committee appointed by the Board of Trade has reported that a duty ought to be imposed, and the Board and the Treasury concur in the proposal.

Applications will not be entertained in respect of articles of food or drink.

The Board of Trade, in deciding whether a *primâ facie* case for enquiry has been established, will act in accordance with the general rules laid down in Section I hereunder.

Where the Board of Trade are satisfied that a *primâ facie* case for enquiry is established, the Committee appointed by the Board will be invited to report in accordance with the general rules laid down in Section II hereunder.

I. Rules to be applied by the Board of Trade.

The rules to be applied by the Board of Trade in deciding whether to order an enquiry will be as follows :—

(1) The Board must be of opinion that the industry applying for an enquiry in respect of the whole or any part of its production can reasonably be regarded as of substantial importance, on account either of the volume of employment engaged in such production or of the nature of the goods produced.

(2) The Board must be of opinion that there is *primâ facie* evidence that the competition of foreign imports in the industry is exceptional, and that by reason of such competition employment in the production of the goods in question in the United Kingdom is being, or is likely to be, seriously affected.

(3) The applicant industry must also show that in the countries from which such competition largely comes, the conditions in one or more of the respects set out in paragraph (5) of the Rules hereunder, for the guidance of Committees, are so different from those in this country as to render the competition unfair.

(4) The Board of Trade will, in their discretion, reserve the right to refuse an enquiry, irrespective of other conditions obtaining in the industry, if they are of opinion that the industry is not carried on in this country with reasonable efficiency and economy, or that the imposition of a duty on goods of the class or description in question would exert a seriously adverse effect on employment in any other industry being an industry using goods of that class or description in production.

If the Board of Trade are satisfied that a *primâ facie* case is established in accordance with the above conditions, the Board will refer the claim for enquiry to a Committee.

II. Instructions to Committees.

A committee appointed by the Board of Trade for the purpose of such an enquiry will be instructed to report on the following :—

(1) Whether the applicant industry is, by reason of the volume of employment engaged in the production of the goods to which the application relates, or by reason of the nature of the goods produced, an industry of substantial importance.

(2) Whether foreign goods of the class or description to which the application relates are being imported into and retained for consumption in the United Kingdom in abnormal quantities.

(3) Whether the foreign goods so imported are being sold or offered for sale in the United Kingdom at prices which are below the prices at which similar goods can be profitably manufactured or produced in the United Kingdom.

(4) Whether, by reason of the severity and extent of such competition, employment in the manufacture or production of such goods in the United Kingdom is being, or is likely to be, seriously affected.

(5) Whether such exceptional competition comes largely from countries where the conditions are so different from those in this country as to render the competition unfair.

Competition for the purpose of such enquiry is not to be deemed to be unfair unless it arises from one or more of the following causes :—

(*a*) Depreciation of currency operating so as to create an export bounty.

(*b*) Subsidies, bounties, or other artificial advantages.

(*c*) Inferior conditions of employment of labour, whether as respects remuneration or hours of employment, or otherwise, obtaining amongst the persons employed in the production of the imported goods in question as compared with those obtaining amongst persons employed in the production of similar goods in the United Kingdom.

In making their report upon the alleged unfairness of the competition, the Committee may call attention to any special circumstances by reason of which, in their opinion, the industry in the United Kingdom is placed at a serious relative disadvantage.

(6) Whether the applicant industry is being carried on in the United Kingdom with reasonable efficiency and economy.

(7) Whether the imposition of a duty on goods of the class or description in question would exert a seriously adverse effect on employment in any other industry, being an industry using goods of that class or description in production.

(8) Whether, having regard to the above conditions, the applicant industry has, in the opinion of the Committee, established a claim to a duty ; and, if so, what rate or rates of duty, in the opinion of the Committee, would be reasonably sufficient to countervail the unfair competition.

III. Constitution of Committees.

A Committee will consist of not more than five persons appointed by the President of the Board of Trade. No person whose interests may be materially affected by any action which may be taken on the report of a Committee will be eligible for appointment as a member of the Committee.

IV. Procedure of Committees.

A Committee to whom a complaint is referred will have power to determine its own procedure, having regard to the particular matters on which it is instructed to report. The sittings of a Committee at which evidence is taken shall be held in public, except that a Committee shall refuse to allow the public to be present at any proceedings of the Committee during the hearing of evidence on matters which, in its opinion, are of a confidential character.

2. Particulars of Applications Referred to Committees under Safeguarding of Industries Procedure of February, 1925.

Subject of application. Date of appointment of Committee. Date and Command Number of Report.	Recommendations.	Action taken.*
Lace and embroidery. 9th March, 1925. 27th April, 1925. Cmd. 2403.	Duty of 33⅓ per cent. recommended on lace or cotton, silk or other fibre, and on "Embroidery manufactured on net or dissoluble or otherwise eliminable fabric."	Duty imposed for five years from 1st July, 1925, by Section 6 of Finance Act, 1925.
Superphosphates. 19th March, 1925. 24th June, 1925. Cmd. 2457.	Committee decided by a majority not to recommend a duty.	No action.
Leather and fabric gloves, and glove fabric. 25th April, 1925. 6th July, 1925. Cmd. 2531.	Duty of 33⅓ per cent. recommended on leather gloves and on fabric gloves of cotton, but not on glove fabric, except when cut out ready for sewing.	Duties imposed as recommended (and on fur gloves) for five years from 22nd Dec., 1925, by Safeguarding of Industries (Customs Duties) Act, 1925.
Gas Mantles. 25th April, 1925. 29th July, 1925. Cmd. 2533.	Duty of 6*s.* per gross recommended.	Duty imposed for five years from 22nd Dec., 1925, by Safeguarding of Industries (Customs Duties) Act, 1925.
Aluminium hollow-ware. 12th Sept., 1925. 12th Nov., 1925. Cmd. 2530.	Duty not recommended.	No action.
Cutlery. 29th Sept., 1925. 23rd Nov., 1925. Cmd. 2540.	Duty of 33⅓ per cent. recommended.	Duty imposed for five years from 22nd Dec., 1925, by Safeguarding of Industries (Customs Duties) Act, 1925.

* See Table I, page 454, for particulars of the Imperial Preferential rebates granted from the duties mentioned in this column.

2. PARTICULARS OF APPLICATIONS REFERRED TO COMMITTEES UNDER SAFEGUARDING OF INDUSTRIES PROCEDURE OF FEBRUARY, 1925.—*contd.*

Subject of application. Date of appointment of Committee. Date and Command Number of Report.	Recommendations.	Action taken.*
Packing and wrapping paper. 7th Sept., 1925. 25th Nov., 1925. Cmd. 2539.	Duty of 17½ per cent. recommended on packing and wrapping paper and on such paper contained in manufactured articles in which the value of the wrapping paper as raw material exceeds a given proportion of the value of the whole article.	Duty of 16⅔ per cent. imposed on packing and wrapping paper, and articles made of such paper in which the value of materials other than wrapping paper does not exceed one sixth of the value of the whole article, for five years from 1st May, 1926, by Section 11 of Finance Act, 1926.
Brooms and brushes. 12th Sept., 1925. 30th Nov., 1925. Cmd. 2549.	Duty not recommended . .	No action.
Worsted and woollen fabrics between the weights of 2 oz. and 11 oz. per square yard. 14th Oct., 1925. 22nd Feb., 1926. Cmd. 2635.	Duty not recommended, but Committee recommended that situation should be carefully watched and a duty of 12½ per cent. imposed "if seriously increased unemployment in the industry arising from a substantial increase in the volume of retained imports be accompanied by an increase in the bounty obtained by foreign manufacturers as a result of further currency depreciation."	Situation is being watched by the Board of Trade in accordance with the recommendations of the Committee.

* See Table I, page 454, for particulars of the Imperial Preferential rebates granted from the duties mentioned in this column.

2. Particulars of Applications Referred to Committees under Safeguarding of Industries Procedure of February, 1925.—*contd.*

Subject of application. Date of appointment of Committee. Date and Command Number of Report.	Recommendations.	Action taken.
Enamelled hollow-ware. 2nd Nov., 1925. 31st March, 1926. Cmd. 2634.	Duty not recommended ..	No action.
Hosiery. 25th Feb., 1926. 10th July, 1926. Cmd. 2726.	Duty not recommended, but Committee suggested that if the importation of cotton hose and underwear continued to increase and was accompanied by an increase in unemployment "the applicants should be afforded a further opportunity of putting forward fresh evidence on the question of costs of production."	Situation is being watched by the Board of Trade in accordance with the recommendations of the Committee.
Light leather goods and metal fittings for leather goods. 13th Sept., 1926.	..	..
Table-ware of translucent pottery. 7th Oct., 1926.	..	..

ANNEX F.

Imports of Dutiable Goods into the United Kingdom.

Values of all retained imports, values of retained imports of dutiable goods, and amounts of duty collected, distinguishing the "new" duties*, during the years 1910 to 1913 and 1922 to 1925.

Note.—From the 1st April 1923, the particulars relate to Great Britain and Northern Ireland only.

	1910.	1911.	1912.	1913.	1922.	1923.	1924.	1925.
	£ Millions.	£ Millions.	£ Millions.	£ Millions.	£ Millions.	£ Millions.	£ Millions.	£ Millions.
Value of :—								
Total imports retained ..	574·5	577·4	632·9	659·2	899·4	977·7	1,137·5	1,168·7
"Class I" imports retained† ..	244·8	249·6	265·5	278·9	450·1	484·3	541·3	538·0
Dutiable imports retained subject to :—								
(*a*) old duties	53·3	58·8	59·8	60·3	113·3	120·1	134·5	123·0
(*b*) new duties*	—	—	—	—	8·3	10·6	4·6	12·0
Duty collected under :—								
(*a*) old duties	32·7	33·7	33·8	35·0	125·5	120·3	104·1	99·5
(*b*) new duties*	—	—	—	—	2·6	3·4	1·4	2·4
Proportion of dutiable imports to total imports	Percentage 9·3	Percentage 10·2	Percentage 9·4	Percentage 9·1	Percentage 13·5	Percentage 13·4	Percentage 12·2	Percentage 11·6
Proportion of imports dutiable under old duties to Class I. imports†	21·8	23·6	22·4	21·6	27·0	27·0	25·7	25·1

* The "new" duties comprise the McKenna duties (not in operation between 1st August, 1924, and 1st July, 1925) and the duties under the Safeguarding of Industries Act (some of which lapsed in August, 1924); together with the silk duties and the lace duty, in operation from 1st July, 1925. Retained imports of such goods have only been treated as dutiable if imperial during the period when the duty was in force.

† Food, Drink and Tobacco constitute Class I. imports, this being the category covering all but a small part of the goods subject to "old" duties.

ANNEX G.

Imperial Preference.

Table I.

Amounts of Preferences in Force.

SPECIFIC DUTIES.

Article.	Unit of Quantity.	Main Full Rate of Customs Duty. £ s. d.	Preferential Rebate. £ s. d.	Preferential Duty. £ s. d.
Spirits	proof gallon	3 15 4	0 2 6	3 12 10
Wine :—				
Not exceeding 30 deg. of proof spirit	gallon	0 2 6	0 1 0	0 1 6
Exceeding 30 and not exceeding 42 deg.	,,	0 6 0	0 4 0	0 2 0
Per degree exceeding 42	,,	0 0 6	0 0 4	0 0 2
Surtaxes :—				
Still wine in bottle	,,	0 2 0	0 1 0	0 1 0
Sparkling wine	,,	0 12 6	0 6 3	0 6 3
Tea	lb.	0 0 4	0 0 $0\frac{2}{3}$	0 0 $3\frac{1}{3}$
Cocoa	cwt.	0 14 0	0 2 4	0 11 8
Coffee	,,	0 14 0	0 2 4	0 11 8
Chicory	,,	0 13 3	0 2 $2\frac{1}{2}$	0 11 $0\frac{1}{2}$
Sugar :—				
Exceeding 98 deg. of polarisation, i.e. fully refined	,,	0 11 8	0 4 $3\frac{1}{3}$	0 7 $4\frac{2}{3}$
Dried Currants	,,	0 2 0	0 2 0	Free
Dried Raisins, Figs and Plums	,,	0 7 0	0 7 0	Free
Tobacco :—				
Unmanufactured, unstripped	lb.	0 8 2	0 2 $0\frac{1}{2}$	0 6 $1\frac{1}{2}$
Cinematograph Films :—				
Blank Film	linear ft.	0 0 $0\frac{1}{3}$	0 0 $0\frac{1}{6}$	0 0 $0\frac{2}{6}$
Positives	,,	0 0 1	0 0 $0\frac{1}{3}$	0 0 $0\frac{2}{3}$
Negatives	,,	0 0 5	0 0 $1\frac{2}{3}$	0 0 $3\frac{1}{3}$
Silk :—				
Raw, undischarged	lb.	0 3 0	0 0 6	0 2 6
Artificial Silk :—				
Singles yarn and straw	lb.	0 2 0	0 0 4	0 1 8
Hops	cwt.	4 0 0	1 6 8	2 13 4
Gas Mantles	gross	0 6 0	0 2 0	0 4 0

AD VALOREM DUTIES.

	Full Duty. Per cent. of value of Article.	Preferential Rebate. Per cent. of value of Article.	Preferential Duty. Per cent. of value of Article.
Clocks and Watches	33⅓	11⅑	22⅔
Motor cars and Motor cycles ..	33⅓	11⅓	22⅔
Musical instruments	33⅓	11⅓	22⅔
Silk and artificial silk :—	33⅓	5⅔	27⅝
Made-up articles ..	10	1⅔	8⅓
	2	⅓	1⅔
Lace and embroidery	33⅓	11⅑	22⅔
Cutlery	33⅓	11⅓	22⅔
Gloves	33⅓	11⅓	22⅔
Packing and wrapping paper ..	16⅔	5⅑	11⅑

TABLE II.

QUANTITIES OF EMPIRE GOODS ENTITLED TO PREFERENCE, AND OF CORRESPONDING FOREIGN GOODS*, CONSUMED IN THE UNITED KINGDOM, AND PROPORTION OF EMPIRE GOODS TO TOTAL (1925–6).

Article.	Unit of quantity.	*Quantity retained for consumption.* At full rate of duty.	At preferential rate of duty.	Total.	Proportion of Empire goods to total.
					Per cent.
Spirits :—					
Brandy ..	proof gallon	635,000	1,000	636,000	0·2
Rum	,,	58,000	1,037,000	1,095,000	94·7
Other sorts ..	,,	217,000	372,000	589,000	63·1
Total Spirits	,,	910,000	1,410,000	2,320,000	60·8
Wine	gallon	15,015,000	1,002,000	16,017,000	6·3
Tea	lb.	52,239,000	353,955,000	406,194,000	87·1
Cocoa :—					
Raw	cwt.	80,000	905,000	985,000	91·9
Butter ..	,,	27,000	—	27,000	—
Preparations ..	,,	201,000	—	201,000	—
Coffee	,,	160,000	159,000	319,000	49·9
Chicory ..	,,	64,000	—	64,000	—
Sugar, &c. :—					
Sugar, Raw & Refined.	,,	25,178,000	7,335,000	32,513,000	22·6
Articles containing sugar	,,	4,826,000	181,000	5,007,000	3·6
Molasses ..	,,	1,218,000	59,000	1,277,000	4·6
Glucose ..	,,	783,000	12,000	795,000	1·5
Saccharin ..	oz.	3,000	—	3,000	—

* Not including goods subject to Key Industry duties (*see* p. 404).

TABLE II—*contd.*

Article.	Unit of quantity.	*Quantity retained for consumption.* At full rate of duty.	At preferential rate of duty.	Total.	Proportion of Empire goods to total.
Fruit, Dried or Preserved :—					
Currants ..	cwt.	1,076,000	126,000 (*a*)	1,202,000	10·5
Raisins ..	,,	750,000	429,000 (*a*)	1,179,000	36·4
Figs	,,	158,000	—	158,000	—
Plums ..	,,	359,000	16,000 (*a*)	375,000	4·2
Tobacco :—					
Unmanufactured	lb.	119,268,000	14,568,000	133,836,000	10·9
Cigars ..	,,	559,000	54,000	613,000	8·9
Cigarettes ..	,,	67,000	4,000	71,000	4·8
Other manufactured	,,	253,000	14,000	267,000	5·3
Total Tobacco ..	,,	120,147,000	14,640,000	134,787,000	10·9
Cinematograph Films (*b*)	linear foot	19,775,000	99,000	19,874,000	0·5
Silk and Artificial Silk (other than made-up articles) (*b*) (*e*)	lb.	7,872,000	54,000	7,926,000	0·7
Hops (*c*)	cwt.	29,000	1,000	30,000	1·8
Gas mantles (*d*) ..	gross	12,000	—	12,000	—
		Value £	Value £	Value £	
Clocks and watches (*b*) ..		534,000	7,000	541,000	1·3
Motor cars, &c. (*b*) ..		1,428,000	835,000	2,263,000	36·9
Musical Instruments (*b*)		409,000	7,000	416,000	1·6
Silk & Artificial Silk :—					
Made-up articles (*b*) (*e*)		4,045,000	35,000	4,080,000	0·9
Lace & embroidery (*b*) ..		523,000	4,000	527,000	0·8
Cutlery (*d*)		43,000	4,000	47,000	8·7
Gloves (*d*)		283,000	—	283,000	—

(*a*) Including quantity delivered free on and after 1st July, 1925.
(*b*) From 1st July, 1925.
(*c*) From 16th August, 1925.
(*d*) From 22nd December, 1925.
(*e*) No deduction has been made in respect of articles exported on drawback since these cannot be allocated to the separate headings for silk.

CHAPTER VII.

PROFITS, SAVINGS, CHARGES, &c.

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PROFITS OF INDUSTRY AND TRADE.

1. Relation of Profit to Capital.

This note is based on the information contained in the articles on "Industrial Profits" which are published quarterly in the "Economist," summarising the results shown in the accounts of public companies as analysed in that journal during the preceding quarter. In those articles the companies dealt with are classified in groups according to the industry or trade carried on. For the present purpose, attention has been confined to the groups of manufacturing and trading companies which operate mainly, though not exclusively, in this country, viz. iron, coal and steel; motor and cycle; breweries; shipping; and "miscellaneous," the last group including textiles, chemicals, electrical apparatus, cables, bricks, cement, and other manufacturing companies, together with shops, hotels, entertainments and other diverse items.

The following table summarises the results for the companies in those groups whose reports were analysed in the "Economist" during the four years ended 30th June, 1914, 1924, 1925 and 1926:—

Period.	Number of Companies.	Total Capital.*	Total Profit.†	Ratio of Profit to Capital.
		£000.	£000.	Per cent.
Year to 30th June, 1914 ..	472	492,257	52,125	10·59
,, ,, ,, 1924 ..	705	1,128,627	102,287	9·06
,, ,, ,, 1925 ..	739	1,171,774	113,760	9·71
,, ,, ,, 1926 ..	760	1,215,752	116,644	9·59

On an average of the three years to 30th June, 1926, the ratio of profit to capital was 9·46 per cent. for the companies included in the table.

In the twelve years under review there was an increase from 472 to 760 companies covered by the survey, and the average capitalisation grew from £1,043,000 to £1,600,000, or by about 53 per cent. The Table on page 125 shows that, in the same period, the average paid-up capital of all companies registered under the Companies Acts rose from £40,000 to £47,000, but this includes private companies.

* Paid-up ordinary and preference capital, together with debentures.

† Dividends on ordinary and preference capital, interest on debentures, and sums allocated to reserves etc.

It is clear that the comparability of the figures in the last column of the table as to ratio of profit to capital may be affected by a number of factors, and on some of these no information is available. For example, it is not determined how far the increase in the aggregate capital may be due to the inclusion of companies which were not tabulated in 1913–14 though in existence, to new company creations, or to additions to the capital of companies tabulated in the pre-war year ; nor, in so far as the increase is due to expansion in the capital of existing companies, is there information as to whether this expansion represented the capitalisation of reserves previously earned, the issue of fresh capital for extensions, or the mere inflation of capital values without the creation of any new productive instruments. Again, any material alteration in the ratio of bank loans and of reserves employed in the business of the companies to their share and debenture capital would clearly affect the interpretation of the tabulated ratios of profit to capital ; but information on this subject is not available. Differences in the number and characteristics of the companies which make up the total in the different years might obviously influence the comparability of the ratios ; and it is clear that, as the table relates entirely to public companies, the ratio of profit to capital derived from it is not necessarily representative of British industry and trade in the aggregate, having regard to the prevalence of private companies, firms and businesses in some trades and industries.

The following table indicates how the total capital shown in the previous table was divided as among debentures, preference capital and ordinary capital, together with the average rate of return on these three categories, and the percentage of total capital added to reserves :—

Year.	Total capital.	Division of total capital among			Total profit.	Allocation of profit.			Percentage of total capital added to reserves.	Ratio of total profit to total capital.
						Average percentage return on capital.				
	£1,000.	Debenture.	Preference.	Ordinary.	£1,000.	Debenture.	Preference.	Ordinary.		
	£	%	%	%	£	%	%	%		
1913–14 ..	492,257	27·69	29·34	42·97	52,125	4·26	5·46	11·36	2·9	10·59
1923–24 ..	1,128,627	18·0	32·6	49·4	102,287	5·19	5·40	9·39	1·73	9·06
1924–25 ..	1,171,774	18·53	32·97	48·50	113,760	5·28	5·70	10·09	1·10	9·71
1925–26 ..	1,215,752	18·84	33·14	48·02	116,644	5·24	5·63	10·57	1·67	9·59

2. Relation of Profit to Turnover.

This Note is derived from the evidence submitted by Mr. W. H. Coates, LL.B., B.Sc.(Econ.), to the Committee on National Debt and Taxation in December, 1925, and particularly from a Memorandum on the Incidence of Income Tax which accompanied his evidence. The Memorandum was compiled by Mr. Coates from statistical materials passing through his hands while he was Director of Statistics and Intelligence in the Inland Revenue Department. It was, however, put forward by him after resigning this post, and he took responsibility for the manner in which the material was analysed and presented in the Memorandum. In the annex to this Note will be found information (summarised from Mr. Coates' Memorandum) as to the meaning of certain terms used, and as to some of the qualifications to which the results (which were obtained by the method of sampling) are subject. It will be observed that the profits to which reference is made are the profits for the periods specified as computed for purposes of income tax subject to the modifications described in the annex. It will also be observed from what follows that the Memorandum relates solely to the profits and turnover of corporate, as distinct from private, enterprises. For a complete explanation of the investigation, reference should be made to the full text of the Memorandum as submitted by Mr. Coates to the Committee on National Debt and Taxation.

In that part of the Memorandum relating to the rate of profit secured by industry, the question whether capital or turnover should be adopted as the basis for the measurement of profit is discussed, and reasons are given for selecting turnover. In this connexion Mr. Coates points out that "the amount of real capital employed by any concern is not a fixed amount, although commonly so regarded. When once liquid money capital has been invested in appliances of production or other industrial assets, the value of that capital ceases to be the amount of the money invested and becomes instead a mere reflection of the rate of earnings expected from the investment taken in conjunction with the current or expected rate of interest. . . . . Moreover, every change in the price level affects the real capital value of money invested during a period of a different price level, and business prudence operating through accounting methods may also effect considerable changes on an original invested capital. The alternative base adopted, viz. turnover, has disadvantages of its own, though they are not so great as those of capital. The pound of turnover varies automatically with every change in the price level." On the foregoing and other grounds Mr. Coates felt that the unit of turnover constituted a generally reliable base to which the unit of profit could suitably be related.

Dealing with the method by which his tables had been constructed, Mr. Coates said: "On the principle that it was necessary to compare like with like, it was apparent that the profits to be compared should

be profits containing like elements. A distinction had to be drawn between profits secured by individuals, whether trading on their own account or as members of a partnership, and those of a company. In the former case profit excludes and in the latter case it includes that element of profit which represents the earnings or personal remuneration of management. To preserve uniformity, therefore, the statistical investigation was limited to the data available in the case of companies. The analysis and comparison of profits in 1912–13 and 1922–23 were, therefore, made by extracting for all cases in which information was available the percentage rate of profit on turnover, and classifying the cases according to that percentage."

Seven particular trade groups were investigated, viz. :—

(1) cotton—spinning, weaving, etc. ;

(2) wool—spinning, weaving, alpaca, mohair, carpets, etc. ;

(3) iron and steel, etc.—ironworks ; iron and steel (founding, rolling and casting) ; machinery and mechanical engineering (including electrical engineering, but excluding civil engineering and contracting) ; shipbuilding and marine engineering ; and combinations of the foregoing ;

(4) metals—railway carriages, wagon and tramcar building ; cycle and motor trades ; anchor, chain, nail, bolt, rivet and screw trades ; small arms, cutlery, tools, implements, needle, pin, fish-hook and button trades ; locks, safes ; wrought iron and steel tubes ; wire trade ; galvanised sheets, hardware, hollow-ware, tinned and japanned goods and bedsteads ; copper and brass trades (smelting, rolling, casting and finishing) ; gold and silver plate and plated goods ; watches, clocks and jewellery ; lead, tin, zinc, and other metals ; tinplate trade, and other miscellaneous metal industries ;

(5) food—grain milling ; biscuit and bread making (wholesale) ; cocoa, confectionery and fruit preserving ; and other miscellaneous food trades ;

(6) wholesale distribution—merchants, warehousemen, agents, etc., connected with the distribution of goods, produce and merchandise which is not worked upon otherwise than by sorting or blending ;

(7) retail distribution—purely distributive retailers (where the vendor renders no personal services other than in distribution, e.g., grocer, tobacconist, newsagent, greengrocer, draper) ; and semi-industrial retailers (having manufacturing and productive elements, e.g., carpenter, gasfitter, blacksmith, laundry, baker, nurseryman, monumental mason, tailor). It does *not* include hotels, inns, beerhouses, refreshment houses, retailers of beers, wines, spirits and liquors.

The following tables and comments are taken from Mr. Coates's Memorandum.

Table A.

Profit as a Percentage of Turnover.

Dispersion 1912–13 *and* 1922–23 *for the aggregate of the seven groups.*

Value of the Variable.	1912–13. Percentage of the total Turnover.	1922–23. Percentage of the total Turnover.
—20 and below	0·03	0·87
—19·9 to —10	0·03	2·07
— 9·9 „ — 5	0·04	2·39
— 4·9 „ — 0	1·92	8·96
0·0 „ 0·9	9·44	8·33
1 „ 1·9	7·69	9·86
2 „ 2·9	11·02	10·25
3 „ 3·9	14·57	6·45
4 „ 4·9	8·69	7·41
5 „ 5·9	11·45	7·48
6 „ 6·9	6·22	5·52
7 „ 7·9	5·86	3·85
8 „ 8·9	3·96	3·40
9 „ 9·9	4·01	2·85
10 „ 10·9	2·23	2·98
11 „ 11·9	2·59	1·75
12 „ 12·9	2·95	1·29
13 „ 13·9	1·48	1·41
14 „ 14·9	0·54	1·08
15 „ 19·9	3·24	5·47
20 „ 24·9	1·10	3·31
25 „ 29·9	0·18	1·51
30 „ 39·9	0·59	0·93
40 „ 49·9	0·05	0·33
50 and over	0·12	0·25
Total	100·00	100·00

Note.—The dispersion given for 1922–23 is that which would have existed had there been no alteration in the relative contribution of each group to the total turnover.

The similarity of the dispersions is very remarkable, though it is not obvious at first sight. It will be better appreciated by the following statistical co-efficients for the two years, viz. :—

	1912–13.	1922–23.
Median	4·61	4·11
Lower quartile	2·53	1·24
Upper quartile	7·67	8·46
Skewness	plus 0·19	plus 0·20
Average or mean	5·80	5·43
Mean deviation from the median	3·59	6·01

The medians and the means (or averages) are very close to one another for these two years, separated by a decade and the cataclysms of that period. If the 1912–13 median and average are each expressed by 100, then in 1922–23 the median was 89 and the average 94. That the general distribution of the curve given by the dispersions is similar is shown by the close approximation of the measurements of skewness, plus 0·19 in 1912–13 and plus 0·20 in 1922–23. But the quartile measurements indicate as clearly that the shape of the curve has altered. The lower quartile has fallen from 2·53 to 1·24 while the upper quartile has risen from 7·67 to 8·46. The range over which the middle half of the business was done has, therefore, widened from 5·14 to 7·22. Apparently there was a greater uncertainty in the results of business in 1922–23 than in 1912–13 ; it is measured by the increase of the mean deviation about the median from 3·59 to 6·01, i.e. in the ratio 100 : 167.

The statistical co-efficients for the seven separate groups are shown in the following Table B, and the dispersions are given in Table C, page 464.

TABLE B.

Statistical Co-efficients for each of the seven groups.

Group.	Year.	Median.	Lower Quartile.	Upper Quartile.	Skewness.	Average or Mean.	Mean Deviation from Median.
Cotton	1912–13	6·56	5·01	8·91	+·21	7·00	2·54
	1922–23	2·55	−1·65	7·18	+·05	2·47	6·63
Wool	1912–13	8·60	5·43	10·56	−·24	8·19	2·94
	1922–23	9·73	3·77	14·57	−·10	9·78	7·37
Iron and Steel, etc.	1912–13	6·25	3·69	9·75	+·16	7·49	4·19
	1922–23	7·48	4·02	13·22	+·25	7·74	8·30
Miscellaneous Metal Industries	1912–13	4·15	1·22	8·25	+·16	6·10	4·56
	1922–23	4·21	0·92	10·36	+·30	5·22	7·38
Food	1912–13	4·73	3·02	6·86	+·11	5·07	2·43
	1922–23	4·73	1·81	10·95	+·36	7·11	6·12
Wholesale distribution ..	1912–13	2·95	1·50	4·68	+·09	3·90	2·54
	1922–23	2·56	0·99	5·58	+·32	4·14	3·92
Retail distribution	1912–13	6·60	5·06	11·72	+·54	8·48	4·01
	1922–23	4·74	2·40	6·84	−·05	5·14	3·35

TABLE C.

Dispersion 1912–13 *and* 1922–23 *for each of the seven groups.*

Value of the Variable	Cotton.		Wool.		Iron and Steel, etc.		Miscellaneous Metal Industries		Food.		Wholesale Distribution		Retail Distribution		Total.	
	Percentage of Total Turnover.		Percentage of Total Turnover.		Percentage of Total Turnover.		Percentage of Total Turnover.		Percentage of Total Turnover.		Percentage of Total Turnover.		Percentage of Total Turnover.		Percentage	
	1912–13.	1922–23.	1912–13.	1922–23.	1912–13.	1922–23.	1912–13.	1922–23.	1912–13.	1922–23.	1912–13.	1922–23.	1912–13.	1922–23.	1912–13.	1922–23.
−20 and below	—	1·88	—	0·81	0·08	1·87	0·06	1·93	—	0·05	0·01	0·22	—	0·11	0·03	0·87
−19·9 to −10	—	5·15	—	1·42	0·08	4·63	0·13	3·25	—	0·33	—	0·58	—	0·24	0·03	2·67
−9·9 „ −5	—	7·10	—	0·95	0·17	5·42	—	2·09	—	0·76	—	0·58	—	1·20	0·04	2·39
−4·9 „ 0	1·16	16·15	1·16	6·09	1·95	5·04	1·17	14·54	—	10·17	3·34	9·03	—	3·81	1·92	8·98
0·0 „ 0·9	0·85	3·27	0·43	3·20	2·63	1·72	21·28	3·56	2·46	6·98	16·32	14·77	1·80	5·31	9·44	8·33
1 „ 1·9	2·40	7·51	0·66	1·71	2·58	0·92	10·64	5·63	16·83	8·23	10·78	13·18	—	7·33	7·69	9·86
2 „ 2·9	2·86	6·95	5·31	7·24	4·86	3·76	5·66	11·70	5·29	13·15	20·51	11·98	7·80	17·18	11·02	10·25
3 „ 3·9	8·08	5·62	5·59	1·65	18·47	1·50	9·62	5·74	18·70	0·50	16·76	8·82	7·32	9·15	14·57	6·45
4 „ 4·9	9·45	4·39	6·32	3·53	3·98	9·56	11·34	7·87	9·21	5·23	10·75	7·76	7·34	7·18	8·69	7·41
5 „ 5·9	19·69	7·22	12·83	5·35	13·52	5·64	9·04	4·18	20·91	9·06	5·85	5·26	13·91	17·20	11·45	7·48
6 „ 6·9	10·16	2·85	4·51	3·36	6·99	3·85	4·88	3·59	1·84	3·20	3·45	8·64	19·83	7·04	6·22	5·52
7 „ 7·9	10·36	3·93	7·79	6·62	9·34	6·60	0·98	3·46	17·23	2·85	0·86	2·32	6·44	4·76	5·86	3·85
8 „ 8·9	11·20	3·85	9·19	3·54	7·53	5·44	3·00	3·49	2·11	3·61	1·55	1·65	—	5·28	3·96	3·40
9 „ 9·9	9·29	2·93	15·70	3·18	3·53	6·75	3·20	2·87	1·56	2·06	2·71	1·61	4·35	2·24	4·01	2·85
10 „ 10·9	6·35	1·80	10·02	6·23	3·30	5·73	0·70	3·48	0·95	3·60	0·82	1·62	2·32	1·68	2·23	2·98
11 „ 11·9	3·62	1·05	7·85	4·46	2·53	4·50	2·94	2·82	—	2·94	2·02	0·99	5·55	2·69	2·59	1·75
12 „ 12·9	0·79	1·44	6·28	7·82	4·69	1·67	0·78	2·18	—	1·26	2·71	0·40	6·99	1·02	2·95	1·29
13 „ 13·9	1·29	1·27	1·96	2·74	2·25	2·09	1·41	1·18	—	1·53	0·58	1·18	5·59	0·76	1·48	1·41
14 „ 14·9	0·53	1·40	0·90	5·47	1·60	1·38	0·01	1·23	—	0·68	—	0·49	1·46	1·35	0·54	1·08
15 „ 19·9	2·05	4·58	3·48	10·76	6·18	7·92	10·58	9·11	0·20	17·23	0·62	1·89	3·57	3·09	3·24	5·47
20 „ 24·9	0·62	3·28	—	3·71	1·23	8·02	2·45	3·16	2·04	3·46	—	1·32	3·67	0·64	1·10	3·31
25 „ 29·9	—	0·42	—	4·85	0·82	3·04	0·07	2·04	—	1·63	—	0·74	—	0·35	0·18	1·51
30 „ 39·9	—	0·07	—	2·10	1·44	2·37	0·58	0·26	—	1·31	0·15	0·49	2·06	0·12	0·59	0·93
40 „ 49·9	—	0·04	—	0·49	—	0·58	6·12	0·43	0·37	0·81	—	0·18	—	0·02	0·05	0·33
50 and over	—	—	—	0·22	0·04	0·15	0·04	0·23	—	—	0·29	0·50	—	0·04	0·12	0·25
Total	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

A cursory inspection shows that there have been considerable cross movements in detail, which tend to cancel out in gross. The misfortunes of the cotton industry are apparent. The median and the average have both fallen heavily, although in 1922–23 a quarter of the business was still done above 7·18 per cent. on turnover, as against a corresponding figure of 8·91 per cent. in 1912–13. But whereas the middle half of the business was done in 1912–13 at a rate of profit between 5 and 9 per cent. on turnover, in 1922–23 the limits were a loss of, roughly, 1½ per cent. and a profit of 7 per cent. No less than 30 per cent. of the trade sampled resulted in a loss. In the other manufacturing industries, there is a general tendency towards (*a*) a slightly higher median, normally accompanied also by a somewhat higher average, and (*b*) a marked widening of the dispersion. Both quartiles show a tendency to move outward from the median. Thus the mean deviations about the mean are greater in 1922–23 in every group, with the sole exception of the retail distributive trade. In the wool group, the average rate of profit has risen, but the general distribution about the median is less favourable, for the skewness has fallen from minus 0·24 to minus 0·10. The lower quartile has fallen from 5·43 to 3·77. The iron and steel group shows the same kind of movement, though in a smaller degree. Although the median point for the miscellaneous metal industries has risen, the average rate has fallen slightly, but there is the same characteristic of a wider dispersion, and an adverse movement of the skewness from plus 0·16 to plus 0·30. It would seem plain that the manufacturing food trades have improved their broad position, for the average has risen from 5·07 to 7·11, but the composition of the group in the respective years is not entirely on all fours: less complete information was available for 1922–23 in some branches of this class of trade, which tend to show a low rate of profit on turnover. Wholesale distribution makes a poorer show in 1922–23 than 1912–13, for although the average rate is slightly higher, the dispersion is much greater, the median is slightly lower, and the positive skewness has increased considerably. It is doubtful whether the particulars for the retail distributive trade are of great value, for it has been ascertained, on inquiring into the discrepancy between the results for the two years, that it is due in part to the omission (through the accidents of sampling) of any food concerns in 1912–13. As their business is normally conducted at a low rate on turnover, this omission invalidates the comparability of the figures. Apart from this group, however, the broad tendency towards a widening of the dispersion seems plain. Just as the mean deviation about the median is greater, so there is a broad tendency towards an increase in the positive degree of skewness, indicating a tendency towards the distribution of a greater part of the trade about rates of turnover lower in relation to the median in 1922–23 than in 1912–13. But, as already noted, the median in 1922–23 is on a somewhat higher level than that in 1912–13.

Annex.

Procedure followed in the Investigation.

Investigation based on samples.—In compiling statistics for the investigation difficulty arose from the fact that out of the whole body of information available only a certain number of cases yielded the necessary data. Sample information only was, therefore, available. Generally speaking, for sample statistical investigations it is essential that every care should be taken to secure a sample free from bias, and to further this purpose, the sample taken should be random and independent. Very often randomness can be secured by the accidents which make cases available, as in the present instance. An exhaustive investigation is impossible, for obvious reasons, and the reliability of the sample cannot, therefore, be dogmatically asserted. On the other hand, the greater the proportion of the sample taken to the universe sampled, the greater is likely to be the precision of the result. The samples offered by the present investigation are fairly large, and derive some added reliability from this fact.

Classification of concerns.—Concerns have been classified according to the description of their trade usually furnished by taxpayers in making their returns for Income Tax purposes. When a taxpayer carries on two or more kinds of business which fall into different trade classifications, each class is dealt with separately when separate accounts are rendered for each class, and liability to Income Tax is separately computed. In other cases, the concern is usually assigned to the class from which the greater part of the profits is normally derived. It is not uncommon, of course, to meet with concerns which combine wholesale or manufacturing business with retail trade; if in such cases there is a preponderance of retail trade not distinguishable, the entire profits are classified as from retail distribution. Concerns which, in addition to their manufacturing business, carry on also the business of wholesale distribution are normally classified by reference to the manufacturing business, unless that element is negligible.

Range of periods covered.—Assessments to Income Tax in respect of the profits of trades, etc., are computed upon an average of the profits of the three years preceding the year of assessment which begins on the 6th April. For this purpose the trader normally adopts the year for which he makes up his trading accounts. It follows that the extreme range of time that could possibly be covered by the last year's accounts used for the computation of liability for any one year of assessment is practically two years. For example, one concern might base its return for the year of assessment, 1924–25, on its three years' trading to the 6th April, 1923, and another on its three years' trading to the 5th April, 1924. The period covered by the most recent trading years of these two traders taken together would stretch from the 7th April, 1922, to the 5th April, 1924. In the tables the particulars for any one year relate to accounts made up to a date ended within that year, i.e., within the Income Tax year beginning on the 6th April and ending on the following 5th April.

Meaning of "Profits."—No average profits have been used in the compilation of the statistics. Each result included represents the trader's profit for one year as computed for purposes of Income Tax, subject to three modifications which appeared necessary to secure, for the present purpose, a true comparison between the amount of profit and that of turnover. The first two modifications consist in the exclusion of any effect of payments or repayments of Excess Profits Duty and Corporation Profits Tax. The profit is presented as it would have been had these two taxes not existed. Had this

course not been followed, the profit included in the statistics would not have been the whole profit arising, but only a part thereof. Excess Profits Duty, it will be recalled, extended to all businesses, whether carried on by private traders or companies. Corporation Profits Tax, on the other hand, was levied only on limited liability companies. The third modification relates to the allowance for wear and tear, or depreciation, of plant and machinery. For the present purpose, the amount of the allowance for the year of assessment in which the final date of the account fell has been deducted from the amount of profits shown by that account.

Meaning of "Turnover."—The turnover tabulated represents the total receipts of the business from the sale of goods or from remuneration paid in respect of services. It excludes any receipts from rents or property let, interest on loans, dividends on investments, etc.

Difficulties in using turnover as a basis.—The unit of turnover as a basis for measuring the rate of profit is subject to some difficulties. At times of rapidly changing prices, the rate of change in the unit of turnover differs from that of the unit of correlated profit, owing to the time lag between the date of purchase and that of sale. Any given increment or decrement of price may equally affect both turnover and profit, and so it may very greatly disturb their relation to one another. This difficulty is, however, minimised as soon as prices become more stable, and for the year 1922–23 the disadvantage is not great enough to rule out the unit of turnover as a basis of measurement. Another difficulty arises from the varying rate of turnover in different businesses in the same trade. This factor is, however, probably small when a fairly broad classification of industry is adopted. But it may still have some effect if a business—treated as a separate entity for purposes of Income Tax—is in reality linked up intimately with other concerns, separately treated for taxation purposes. Internal arrangements between businesses so connected may possibly have the effect of artificially distributing the total profits arising from the operation of all the businesses, in such wise that a greater rate of profit than the actual is shown by one kind of business and a smaller rate by another. Another source of disturbance as between different years is to be found in changes which take place in the nature and scope of various business concerns. Extensions of business may be either in the direction of a greater *quantum* of business of the same kind, or in the direction of fresh activities. In the former event, a movement of the rate of profit on turnover may be due either to the greater internal economies possible in the business or to the general forces of demand and supply; in the latter event, the movement may arise entirely because the new activities introduce a new relation between profit and turnover. A further difficulty arises from the varying proportions in which different businesses in the same trade derive their total earnings from remuneration for services and the sale of goods respectively. A commission or agency business, when combined with a distributive business buying and selling goods on its own account, will tend to raise the rate of profit or turnover for the whole business, because the more vocational the service the closer does the amount of profit approach the amount of turnover. These or similar causes may offer, in some cases, broad explanation of the presence of high rates of profit on turnover where they occur. But it is not with that extreme of the distribution of profits on turnover that the present investigation is primarily concerned. The relation of the unit of profit (or loss) to the independent variable of the unit of business turnover thus appears to provide, when the price level is not fluctuating abnormally, a basis for testing whether typical trade groups consist largely of representative concerns equipped with appliances and ability more or less on the same level, or, on the other hand, of concerns varying so largely, either as respects appliances or ability, that their relative trading results show very wide divergencies.

3. Distribution of the Product of Industry.

This Note summarises results set out in the Report on the First Census of Production, 1907 (see particularly pages 35–6), and other results obtained by careful examination of information of varying completeness and precision, regarding the amount of capital used in, and the distribution of the net output of, productive industry. The aggregate capital employed in the industries covered by the Census of Production was estimated at about £1,400,000,000 to £1,600,000,000 in 1907. The "net output" was recorded at £712,000,000, and the numbers employed at approximately 7,000,000 persons, of whom about 6,500,000 were wage-earners.

Estimates of the aggregate wages paid to these wage-earners in 1907 indicate a total of £450,000,000 within, perhaps, 5 per cent. This represents an average per head of £69, or 26*s.* 6*d.* per week (27*s.* 6*d.* if absences of a fortnight on average are allowed for), but the figure has been reached by aggregation of detailed estimates for separate industries, not from an estimate of an all-round average wage.

The provision for replacement and depreciation of plant was estimated as being about £65,000,000 to £75,000,000 so far as not already provided for in the calculation of the net output.

Salaries are difficult to estimate, as "salaried persons" include many members of administrative staffs on a low scale of remuneration. Perhaps an aggregate of £50,000,000 may be estimated, representing an average of £100 per year per person. It may be noted that proprietors of businesses will, in most cases, be renumerated out of "profits," so that the number to be provided for out of the gross sum estimated is reduced below the round half million.

General charges must be a matter of estimate. The gross value of the products was returned as £1,765,000,000, but the elimination of duplicate entries reduces this figure by about 30 per cent. to a little under £1,250,000,000 (see page 25 of Report). Looking at this figure and at the net output, an allowance for rents, rates, taxes, advertising and other like charges of £25,000,000 would appear not to err on the side of excess. On this basis, the following table may be constructed :—

(Year 1907.)	Million £.
Capital engaged	1,500
Net output	712
Wages	450
Salaries	50
Depreciation	70
Other general charges	25
Remaining for profits (including allocation to reserves, and remuneration of proprietors not included in "Salaries.")	117

It may be recalled that 1907 was above the average of years in regard to the general level of business profits, as the breakdown came late in the year.

Although the table cannot lay claim to any high degree of precision, it may serve to indicate the approximate relations of the sums applied out of the values produced in manufacturing and mining establishments in the United Kingdom in 1907 to the remuneration of the various agents of production. The calculation does not, in general, deal with the costs and values of distributive effort, though in such cases as the making of bread, a separation of transport and distributive charges from the charges of manufacture proper was not feasible. The goods dealt with are, in general, valued at the place of production (or delivery by the direct employees of the producer), the materials used up in their production, whose value is deducted from the gross value of goods produced to arrive at the net output, being valued as delivered at the producing establishment (or to the direct employees of the producer).

4. Estimated Trading Profits and Reserves of Companies.

The information contained in the following two tables was prepared by the Board of Inland Revenue for the Colwyn Committee on National Debt and Taxation. The figures are estimates based on sample investigations ; and the Board of Inland Revenue, in furnishing them to the Committee, pointed out that they were subject to a margin of error which might be considerable and that their representative character was limited by the fact that they related to no more than one pre-war and two post-war years. The figures relate only to companies, as distinct from private traders trading alone or in partnership. They show the estimated reserves and trading profits of all companies carrying on business in the several years. The figures for trading profits exclude all investment income, i.e. war stock interest, other dividends, rents of properties let, the annual value of premises owned and occupied, etc.

	1912.	1922.	1923.
	(£ millions)	(£ millions)	(£ millions)
Total undistributed income	102·1	219·0	217·5
Deduct income tax thereon (at 1*s.* 2*d.* for 1912, 5*s.* for 1922, and 4*s.* 6*d.* for 1923)	6·0	54·8	49·1
Balance	96·1	164·2	168·4
Index of balance	100	171	175

In the following table the balances shown above, which represent the amounts placed to reserve by companies in the years indicated, are related to the companies' net trading profits.

	1912.	1922.	1923.
	(£ millions)	(£ millions)	(£ millions)
Total trading profits before deduction of income tax	312	462	474
Total profits after deduction of income tax	294	347	367
Total net amount placed to reserve ..	96·1	164·2	168·4
Ratio between amount placed to reserve and profits after deduction of income tax	33%	47%	46%

SAVINGS.

Deposits in Savings Banks, Funds of Building Societies, etc.

Year.	Post Office and Trustee Savings Bank Deposits. Great Britain.	National Savings Certificates. (Balance due to holders at 31st March in each year, including accrued interest) United Kingdom.	Building Societies. Great Britain.	
			Assets.	Membership.
	£ million.	£ million.	£ million.	
1911	214·5	—	63·6	602,684
1912	220·5	—	64·1	607,721
1913	225·7	—	65·3	617,423
1922	325·7	387·0	107·4	826,032
1923	335·9	418·8	124·7	895,524
1924	346·5	446·1	144·9	1,000,988
1925	353·4	458·8	169·1	1,133,281

IMPERIAL TAXATION.

Yield of the Principal Direct Taxes, together with the Total Receipts from Taxes and the Total Revenue in Certain Years.

(*United Kingdom.*)

Year ending 31st March.	1913-14.*	1922–23.	1923–24.	1924–25.	1925–26.
			(£1,000,000.)		
Yield under Principal Heads of Direct Taxation—					
Estate, etc., duties ..	27·4	56·9	57·8	59·4	61·2
Stamps (exclusive of fee and patent stamps) ..	10·0	22·2	21·6	22·8	24·7
Income tax	43·9	314·8	269·3	273·8	259·4
Super-tax	3·3	64·2	60·6	62·7	68·5
Corporation profits tax	—	19·0	23·3	18·1	11·7
Excess profits	—	2·0	—	0·7	2·0
Total of above items ..	84·6	479·1	432·6	437·5	427·5
Total receipts from taxes	163·0	774·7	718·0	689·7	684·5
Total revenue	198·2	914·0	837·2	799·4	812·0

* Including Irish Free State.

Estimated distribution by sources of the net produce of the income tax, 1922–23.

The following is a summary of a table submitted to the Colwyn Committee on National Debt and Taxation by Mr. W. H. Coates, LL.B., B.Sc. (Econ.), lately Director of Statistics and Intelligence in the Inland Revenue Department. The figures relate to Great Britain together with the whole of Ireland.

Source.	Approximate amounts.	Per cent. of total.
	£000.	
I. Real property	38,100	12·91
II. Farming profits and other profits from land..	1,500	0·51
III. Securities	52,400	17·76
IV. Business—		
(*a*) Mining, manufacturing and productive ..	66,300	22·47
(*b*) Wholesale and retail distribution, transport and communication :—		
(i) Railways in the United Kingdom ..	8,400	2·85
(ii) All other businesses under this head ..	42,600	14·44
(*c*) Finance, professions and all other businesses not included under heads (*a*) and (*b*)	19,100	6·48
Total business	136,400	46·24
V. Employments—		
(*a*) Manual weekly wage-earners	2,200	0·75
(*b*) Other employees	64,400	21·83
Total employments ..	66,600	22·58
Grand total	£295,000	100·00

LOCAL RATES.

Total Amount and Allocation of Rates.

(Great Britain.)

	1913–14	1921–22	1922–23	1923–24	1924–25	1925–26	Percentage increase between 1913–14 & 1925–26
	£000	£000	£000	£000	£000	£000	%
Relief of the poor (including maintenance of pauper lunatics)	13,240	41,138	41,192	36,701	34,515	35,578	168·7
Education (elementary and higher)	18,515	36,500	36,412	34,496	34,761	36,433	96·7
Police	4,971	11,767	9,581	9,814	9,865	10,425	109·7
Highways, health services and all other services of Local Authorities	42,203	99,782	87,266	79,899	80,871	83,662	98·2
Total rates ..	78,929	189,187	174,451	160,910	160,012	166,098	110·4
Average amount of rates collected per head of estimated population ..	£ s. d. 1 17 10	£ s. d. 4 7 10	£ s. d. 4 0 7	£ s. d. 3 13 9	£ s. d. 3 13 1	£ s. d. 3 15 10	100·4

Percentage analysis of total rates 1913–14 and 1925–26.

	1913–14.	*1925–26.*
Relief of the poor	16·8	21·4
Education	23·4	21·9
Police	6·3	6·3
Highways, etc.	53·5	50·4
	100·0	100·0

The foregoing Table has been compiled from the corresponding separate particulars relating to England and Wales, and to Scotland, which have been furnished by the Ministry of Health and the Scottish Board of Health. The figures relate to the years ended 31st March as regards England and Wales and 15th May as regards Scotland. The figures of allocation for 1924–25 and 1925–26 are estimates.

Total Assessable Values and Average Amount of Rates per £.

(England and Wales only.)

	1913–14.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	Percentage increase between 1913–14* & 1925–26
Assessable value of all properties at commencement of year	£000 * 205,565	£000 234,021	£000 239,141	£000 † 236,465	£000 † 241,975	£000 † 246,833	% 20·1
Average amount of rates collected per pound of assessable value ..	*s. d.* 6 8¾	*s. d.* 14 7½	*s. d.* 13 1¾	*s. d.* 12 2	*s. d.* 11 8¾	*s. d.* 11 11½	77·7

Owing to the differences in the systems of rating which obtain in England and Wales and in Scotland, it is not possible to give combined figures for Great Britain in respect of the assessable value of rateable property or the average amount of rates collected per £ of assessable value. The figures included in the table, therefore, relate only to England and Wales. It will be understood that the figure representing the average amount of rates collected per pound of assessable value covers a wide range of actual amounts of rates per £ in different areas. The following tables, extracted from the annual statement of the Ministry of Health for 1926 on the subject of Local Rates, are interesting in this connexion.

Year.	Number of urban areas in which the poundage rate payable in respect of buildings was				
	Less than 12*s.*	12*s.* and less than 17*s.*	17*s.* and less than 20*s.*	20*s.* or more.	Total 12*s.* or more.
1913–14	1,151	2	—	—	2
1921–22	143	734	189	88	1,011
1922–23	282	676	117	73	866
1923–24	486	561	69	31	661
1924–25	491	580	58	18	656
1925–26	433	616	76	23	715

* Calculated in the same way as for 1923–24 and later years (see next foot note).

† Including for the three last years one quarter of the rateable value of agricultural land; and for previous years, one half of the rateable value of that land.

Groups of areas.	Estimated increase per cent. since 1913–14 in the amounts in the pound of local rates payable in respect of buildings.				
	1921–22 compared with 1913–14.	1922–23 compared with 1913–14.	1923–24 compared with 1913–14.	1924–25 compared with 1913–14.	1925–26 compared with 1913–14.
Metropolitan boroughs	101	76	55	51	53
County boroughs ..	108	90	68	63	63
Other boroughs and urban districts ..	100	88	73	67	71
Typical rural parishes	139	114	100	97	104

Incidence of Local Rates on Different Classes of Property.

No particulars appear to be available as to the percentages of the total rates raised in Great Britain which are contributed by different classes of property (e.g., industrial, domestic, etc.) from year to year. Some information of this kind is, however, available (in a Command Paper—2639—on the Rating (Scotland) Bill, 1926) for one year (1923–24) in respect of Scotland; and the table given below has been compiled from this source. It shows clearly that the rates from houses and shops form the preponderating part of the total amount of rates raised, and that industrial undertakings account for about one-eighth of the total.

Incidence of Local Rates on Various Classes of Property in Scotland, 1923–24.

Classes of property.	Local rates.		Gross rentals.	
	Amount.	Percentage of total.	Amount.	Percentage of total.
	£		£	
Mines and minerals, mills and manufactories, steel and iron works, blast furnace works	2,178,700	12·31	4,980,000	11·55
Gas, electricity, water, sewers and sewerage works, railways, tramways and harbours	2,092,000	11·82	5,880,000	13·64
Agricultural land	1,264,900	7·14	5,600,000	13·0
Houses and shops	11,602,900	65·55	25,400,000	58·93
Other subjects	561,500	3·18	1,240,000	2·88
Total	17,700,000	100	43,100,000	100

SOCIAL CHARGES.

National Health and Unemployment Insurance and Workmen's Compensation.

National Health Insurance Contributions and Benefits.

[N.B.—The figures are for calendar years except where otherwise stated.]

(i) *Estimated Number of Persons Insured.*

1913	13,264,400	(Great Britain.)
1924	15,258,000	,,
1925	15,649,100	,,

(ii) *Contributions.*

	Per Person per Week.							
	1913.				1925.			
	Man.	Woman.	Boy.	Girl.	Man.	Woman.	Boy.	Girl.
	d.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
Employer..	3	3	3	3	5	5	5	5
Worker ..	4	3	4	3	5	4	5	4

The State paid 2/9ths, or in the case of women 1/4th, of benefits and administration costs.

Subsequent to the passing of the Widows', Orphans' and Old Age Contributory Pensions Act, 1925, the rates of contribution shown in the following table became payable as from 4th January, 1926, *instead of* those shown in the foregoing table :—

	Per Person per Week.			
	Man.	Woman.	Boy.	Girl.
	d.	*d.*	*d.*	*d.*
Employer	9	7	9	7
Worker	9	6	9	6

Under this scheme the State pays :—

Health.—2/7ths, or in case of women 1/5th, of benefits and administration costs.

Pensions.—£4,000,000 per annum for first ten years from 31st March, 1926.

(iii) *Receipts.*

	15.7.12 to 31.12.13.	1924.	1925.
	£	£	£
Employers' contributions ..	26,541,000	27,376,600*	27,779,400*
Workers' contributions ..			
State contributions	6,394,900	7,045,000	8,073,100
Other receipts	452,700	4,964,000	6,533,100
Total	33,388,600	39,386,000	42,385,600

(iv) *Normal Rates of Cash Benefits.*

	1913.		1925.	
	Men.	Women.	Men.	Women.
	s. d.	*s. d.*	*s. d.*	*s. d.*
Sickness	10 0	7 6	15 0	12 0
Disablement	5 0	5 0	7 6	7 6
Maternity	30 0	30 0	40 0	40 0

Unemployment Insurance Contributions and Benefits.

[N.B.—The Insurance Years run from July to July.]

(i) *Estimated Numbers Insured.*

1913–14	2,326,000	(United Kingdom)
1924–25	11,664,000	(Great Britain and Northern Ireland, including special schemes.)
1925–26	11,892,000	do. do.

Note.—Unemployment Insurance, in 1913, applied to the building trades, construction of works, construction of vehicles, ironfounding, engineering, sawmilling (carried on in conjunction with any other insured trade), and shipbuilding. As from 1920, it applied to substantially all persons earning not more than £250 per annum, the chief exceptions being outworkers, persons employed in agriculture and private domestic service, juveniles under 16 years of age, and certain classes of permanent employees, e.g. permanent civil servants, permanent employees of local authorities, etc.

* The proportion of employers' contributions to workers was approximately 14 to 13.

(ii) *Contributions.*

	Per Person per Week.							
	1913–14.				1924–25.			
	Man.	Woman.	Boy.	Girl.	Man.	Woman.	Boy.	Girl.
	d.	*d.*	*d.*	*d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Employer..	2½	2½	1	1	0 10	0 8	0 5	0 4½
Worker ..	2½	2½	1	1	0 9	0 7	0 4½	0 4
State ..	1⅔	1⅔	⅔	⅔	0 6¾	0 5¼	0 3⅞	0 3⅝
Total ..	6⅔	6⅔	2⅔	2⅔	2 1¾	1 8¼	1 1⅜	1 0⅛

These rates were reduced to the following during 1925–26 :—

	Man.	*Woman.*	*Boy.*	*Girl.*
	d.	*d.*	*d.*	*d.*
As from 4th January, 1926—Employer ..	8	7	4	3½
Do. Do. Worker ..	7	6	3½	3
As from 5th April, 1926—State	6	4½	3	2¼

(iii) *Receipts of the Unemployment Fund.*

	1913–14.	1924–25.	1925–26.*
	£	£	£
Employers' contributions ..	901,470	19,482,365†	17,940,000†
Workers' contributions	901,470	17,534,129†	15,950,000†
State contributions	602,000	13,148,085	13,000,000
Other receipts	53,313	14,671	19,000
Total	2,458,253	50,179,250	46,909,000

(iv) *Weekly Rates of Benefit.*

	1913.	As from 14th August, 1924.	
	s. d.	*s. d.*	
Man	7 0	18 0	Plus 5*s.* in respect of wife or husband, etc. and 2*s.* in respect of each dependent child.
Woman	7 0	15 0	
Boy	3 6	7 6	
Girl	3 6	6 0	

* Provisional figures.

† The division of contributions between employers and workers is approximate only.

Cost of Workmen's Compensation.

The following figures of the total number of persons employed, and of the cost of compensation paid per person employed, in seven groups of industries are taken from the "Statistics of Compensation and of Proceedings under the Workmen's Compensation Acts" for the years 1913 and 1924 issued by the Home Office.*

Industry.	Number of Persons Employed.		Cost per Person Employed.	
	1913.	1924.	1913.	1924.
			s. d.	*s. d.*
Shipping	258,272	207,174	15 2	22 1
Factories	5,342,625	5,242,521	5 0	8 7
Docks	140,820	158,321	24 0	35 5
Mines	1,114,210	1,202,597	24 3	56 2
Quarries	87,541	74,771	10 2	23 4
Constructional work ..	97,954	106,312	13 3	28 0
Railways	467,931	520,663	8 5	11 6
Total ..	7,509,353	7,512,359	8 11	17 9

The figures as to compensation paid represent only the actual amount paid to workmen or their dependants, and not the total charge on the industries in respect of compensation. To compute the total charge it would be necessary to take account of the administrative expenses and medical and legal costs of employers, insurance companies and mutual idemnity associations, the amounts placed in reserve, and the sums set aside by insurance companies as profits.

The Home Office Reports* estimate that, if all these charges and expenses are taken into account, the total charge for compensation in the seven industries in 1913 cannot have been less than £5 millions, and in 1924 cannot have fallen far short of £9 millions. The corresponding figures, calculated on this basis, for the charge per person employed would be 13*s.* 4*d.* in 1913 and 24*s.* in 1924.

INCIDENCE OF LOCAL RATES AND "SOCIAL CHARGES" ON PRODUCTION.

1. Ratio to Cost of Production, Etc.

Tables I and II on pp. 482-3, relating to rates and "social charges†" respectively, have been compiled (except so far as otherwise stated in the footnotes to the tables) from particulars furnished by a number of individual firms in response to the Committee's request

* Cd. 7669/1914 and Cmd. 2567/1926.

† National Health and Unemployment Insurance and Workmen's Compensation.

for information as to the changes between 1913 and 1924 in various factors entering into costs of production. For the purpose of the inquiry, the firms were requested to select for tabulation commodities which should be typical and representative of a large volume of their production. Of those who responded, a number were unable to give information on that basis and therefore provided figures relating to the whole production of their business, or of a department or section of it for which they had details available. In some instances the figures furnished in respect of local rates may conceivably cover expenditure other than rates, e.g. property tax ; but in those cases where such expenditure is known to be included the fact is stated in the footnotes to Table I.

In comparing the pre-war with the post-war percentages of local rates and " social charges " to total cost of production certain qualifications must be borne in mind.

In the first place, it is obvious that a comparison between these percentages is no measure of the increase in the actual amount of local rates and " social charges," and for this reason column 3 has been inserted in each table to show the magnitude of these charges in 1924 (relative to the figures in column 1 representing the pre-war amounts) when the increase in total cost of production is taken into account. It should be borne in mind, however, that in so far as the data furnished related to the cost of production of a section of the output or of an individual article, the figures in column 3 would be affected by the system adopted by the firm of apportioning the total payments on account of rates, etc., to the various departments or various articles produced. In the second place, it should be pointed out that, as the total amount of local rates paid in respect of a given undertaking does not vary with the volume of production, the ratio of rates to cost will rise or fall as production diminishes or increases. Some concrete examples are given in the next section of the present note. This consideration affects the comparison both of column 2 and of column 3 in Table I with column 1. In columns 4 and 5, particulars are given, so far as they are available, as to the ratio of actual to potential production in the two periods considered. In the third place, comparisons may be affected, so far as local rates are concerned, by changes in factory premises and consequent variations in assessments.

The percentages given in the tables obviously do not represent the total (cumulative) incidence of local rates and " social charges " on the cost of production of commodities, but only their incidence at the particular stages of manufacture represented by the instances given. This aspect of the subject is discussed further in the third section of the present note.

An interesting example showing how the apparent magnitude of the burden of rates and " social charges " in relation to cost may be affected by differences in the other elements comprised in total cost is afforded by the figures supplied by a commission *wool-combing*

firm. In this trade the material dealt with, not being the property of the wool combers, does not figure in the total costs, and hence the other elements in cost when expressed as percentages are denoted by much higher figures than in cases like practically all those shown in the tables) where a considerable portion of the total 100 points represents materials. Thus, in the case mentioned, local rates represented 2·13 per cent. of the cost of wool-combing in 1913, and 4·03 per cent. in 1924, while the figure representing the amount in 1924, relative to the figure 2·13, was 10·82. The production in 1924 was about one-half that of 1913. The corresponding figures for State insurance and workmen's compensation were ·95 per cent. in 1913 and 2·16 per cent. (5·80 "actual") in 1924.

Another special case so far as local rates are concerned is afforded by the *railways*. The published statistics compiled by the Ministry of Transport show that local rates paid by the railway companies of Great Britain formed 6·29 per cent. of the total working expenditure in 1913. The amount paid in 1924 (relative to the figure 6·29) was 10·07, but as the total working expenditure increased to a much greater extent, the percentage of rates to total expenditure in 1924 declined to 4·58.

In the case of the *silk* industry, some information has been obtained as to the incidence of local rates and national insurance in respect of groups of typical firms in four separate areas where the industry is carried on. The figures, which are based on value of turnover, are summarised in the following table.

Local Rates and Insurance in the Silk Industry.

	Percentage of total turnover.		Amount in 1924 relative to figure in Col. 1.	Number of employees in 1924 as a percentage of number in 1913.
	1913.	1924.		
	Col. 1.	Col. 2.	Col. 3.	Col. 4.
Area A—	—	—	—	137
Local rates ..	·1600	·1881	·5173	—
Insurance ..	·2265	·4727	1·2999	—
Area B—	—	—	—	114
Local rates ..	·3704	·2764	1·2300	—
Insurance ..	·4471	·3405	1·5152	—
Area C—	—	—	—	89·5
Local rates ..	·3293	·4100	·8056	—
Insurance ..	·1945	·3674	·7219	—
Area D—	—	—	—	79
Local rates ..	·2322	·3311	·5496	—
Insurance ..	·2350	·7440	1·2350	—

I. *Incidence of Local Rates on Cost of Production.*

(Except where otherwise stated, the figures relate to individual undertakings.)

Trade.	Percentage of total cost.		Amount in 1924 relative to figure in Col. 1.	Ratio of actual to potential production in	
	1913.	1924.		1913.	1924.
	Col. 1.	Col. 2.	Col. 3.	Col. 4.	Col. 5.
	%	%	—	%	%
Engineering :—					
A	·3	·9	1·7	—	†78½ of 1913
B	·6	·7	1·2	Not stated	
C	·23	·37	·45	90	85
E	1·0	2·0	3·9	100	55
F	·37	1·16	1·89	73	66
G	·4	·6	·9	64	35
Pig Iron :—					
A	·20	·50	·84	68	48
Ingots	·63	1·28	1·98	78	53
Billets	·22	·46	·73	80	77
Tinplates (*a*) ..	*·26	·43	·73	Not stated	
Cotton Weaving :—					
A	·15	·19	·44	—	†86 of 1913
B	·21	·28	·57	Not stated	
Boots and Shoes ..	·51	·58	1·28	70	83
Hosiery :—					
A	·26	·26	·59	—	†126 of 1913
B	·15	·23	·37	88	58
C	·19	·49	1·33	84	38
D	·2	·3	·5	83	43
Coke :—					
A (*b*)	·45	·88	1·48	—	†94 of 1913
B (*b*)	·79	·56	1·17	—	†82 of 1913
C (*b*)	35	·55	1·24	—	†51 of 1913
Chemicals :—					
Heavy (*a*) ..	1·76	2·42	4·11	84	144
Light ..	·5	·4	·5	—	†312 of 1913
Dyes ..	2·6	2·2	4·9	Not stated	
Coal mining (*c*) :—					
Gt. Britain (excluding S. Staffs and Salop, Cumberland and Bristol) ..	1·64	2·14	4·08	—	†86 of 1913
Agricultural machinery (*d*)	0·40	1·23(*d*)	1·41	—	†45% of 1913

(*a*) Includes Property Tax. (*b*) Includes Water.

(*c*) Compiled from Table A (Appendix 1) and Table 23 (Appendix 8) Vol. 3 "Report of the Royal Commission on the Coal Industry (1925)." The figure in Col. 2 relates to May–July, 1925. The remark in Cols. 4 and 5 is based on tonnage of coal raised in the whole of Great Britain.

(*d*) Based on the figures of firms covering 90 per cent. of the industry. The figure in col. 2 refers to the year 1923.

* Year 1914.

† The "potential" production not being stated, the "actual" production in 1924 is expressed as a percentage of 1913.

II. *Incidence of National Health and Unemployment Insurance (I.) and Workmen's Compensation (W.) on Cost of Production.*

(Except where otherwise stated, the figures relate to individual undertakings.)

Trade.	Percentage of Total Cost.				Amount in 1924 relative to figures in Col. 1.	
	1913.		1924.			
	Col. 1.		Col. 2.		Col. 3.	
	% I.	% W.	% I.	% W.	I.	W.
Engineering :—						
A	·2	·2	·4	·2	·7	·4
B	·6	·1	·8	·1	1·4	·1
C	·25	·11	·56	·17	·67	·20
D	·3	—	·4	—	·6	—
E	·5	—	·8	—	1·5	—
F	·50	·12	·89	·10	1·45	·16
G	·4		·6		·9	
Pig Iron :—						
A	·079	·076	·205	·083	·34	·14
B	·04	—	·19	—	·25	—
Ingots	·067	·065	·160	·065	·25	·10
Billets	·035	·033	·129	·053	·20	·08
Tinplates	·102(*a*)		·320	·156	·537	·262
Cotton (Weaving) :—						
A	·15		·36		·82	
B	—	·02	·50	·01	1·05	·03
Boots and Shoes	·21	—	·52	—	1·15	—
Hosiery :—						
A	·38		·57		1·28	
B	·35		·68		1·10	
C	·26	·03	·59	·05	1·61	·13
D	·3		·9		1·4	
Coke :—						
A	·04	·11	·14	·14	·24	·24
B	·13	·21	·24	·15	·51	·31
C	·09	·24	·22	·20	·49	·45
Chemicals :—						
Heavy	·49	·11	·85	·14	1·44	·24
Light	·1(*b*)	·2	·2(*b*)	·2	·3	·3
Coal mining (*c*) :—						
Great Britain (excluding S. Staffs and Salop, Cumberland and Bristol)	·82	1·10	1·60	1·64	3·04	3·12
Railways, Great Britain (*d*)	·53	·38	·66	·25	1·45	·55
Gas undertakings (*e*)	·30	—	·68	—	1·25	—

(*a*) Includes welfare and relates to year 1914.

(*b*) Includes other Trade Insurances in both years.

(*c*) Compiled from Table 23 (Appendix 8) Vol. 3 "Report of the Royal Commission on the Coal Industry (1925)." The figures in Cols. 2 and 3 relate to May–July, 1925.

(*d*) The figures in Cols. 1 and 2 represent percentage of Total Expenditure.

(*e*) Compiled from "Field's Analysis of the Accounts of the principal Gas Undertakings in England, Scotland, and Ireland." Workmen's Compensation is not stated separately in that publication. The figures given are the average of Metropolitan, Suburban and Provincial Undertakings which together represent more than one half of the output and sales in Great Britain.

2. Cost of Local Rates and "Social Charges" per Unit of Output.

The following Table III shows, in relation to certain steel products, the direct money cost per ton of local rates, workmen's compensation, and health and unemployment insurance in 1913 and 1923. The table is based on the experience of a few firms who specially investigated the question at the request of the National Federation of Iron and Steel Manufacturers.

TABLE III.*

Firm and Product.	1913.				1923.			
	Local rates.	Workmen's Compensation.	National Insurance.	Total.	Local rates.	Workmen's Compensation.	National Insurance	Total.
	s. d.	d.	d.	s. d.	s. d.	s. d.	s. d.	s. d.
Firm A. (*Black c/a Sheets*) ..	1 7	9½	4½	2 9	2 5	1 6	1 10	5 9
Increase per cent.					(53	(90)	(389)	(109
Firm B. (*Steel Plates*) ..	1 4	10½	4	2 6½	3 7½	1 8	1 7	6 10½
Increase per cent.					(172)	(90)	(375)	(170)
Firm C. (*Steel Rails*) ..	0 11	4	2	1 5	3 9	0 8	1 0	5 5
Increase per cent.					(309)	(100)	(500)	(282)
Firm D. (*Combined Products*) ..	0 9½	6	2½	1 6	3 2½	0 8	1 1	4 11½
Increase per cent.					(305)	(33)	(420)	(231)
Firm F. (*Tinplates*)	1 5	4	6	2 3	5 0½	1 1	2 6	8 7½
Increase per cent.					(256)	(225)	(400)	(283)

In respect of a Forge and Rolling Mill, there is also the following information of a similar order obtained from another source. In this case the costs compared are those for the years 1915 and 1924.

	1915.			1924.		
	d.	d.	s d.	s d.	s. d.	s d.
Forge and Rolling Mill	9½	3	1 0½	1 11¼	2 0½	3 11¾
Increase per cent.				(145)	(717)	(282)

*Iron and steel manufacture was not an "insured trade" for Unemployment Insurance pre-war. This partly accounts for the large percentages of increase ranging from 375 to 500 per cent. shown in respect of National Insurance.

Since the incidence of local rates on cost diminishes or increases as production rises or falls, it is of interest to mark the effect on cost where such changes have occurred. Examples of a diminution in production are found in three of the firms included in Table III; and had the volume of production been up to the level of 1913, the cost of local rates per ton of product would have been reduced by roughly 25 per cent. in two cases and 14 per cent. in the third.

Another example is afforded by the agricultural machinery industry where (taking the industry as a whole) local rates represented rather less than one penny in every £ of the total value produced in 1913. In 1923, the value of the output (at 1913 prices) fell by over one-half, and, on this diminished total, local rates represented rather over 3½*d.* in every £, or over 3½ times as much as in 1913.

An even more striking instance of the effect which local rates may have upon cost where there is a serious reduction of output, is the following which was submitted by the President of the Crucible Steel Makers' Association, Sheffield :—

Local rates for year ended 30th June, 1914— 9*s.* 6*d.* in £.
30th June, 1924—18*s.* 8*d.* in £.

Increase in assessment of premises—
46·4 per cent.

Cost per ton of crucible steel on actual output—
30th June, 1914— 3*s.* 0*d.* per ton.
30th June, 1924—21*s.* 0*d.* per ton.

Cost per ton if working full capacity—
30th June, 1924— 6*s.* 8*d.* per ton.

Even if the output in 1923–24 had been the same as that in 1913–14, the cost of local rates per ton would have been more than doubled on account of the increased assessment of the factory premises and the rise in the level of rates per £. As the factory was actually working only one-third of its capacity in 1924 against 95·5 per cent. in 1914, the amount of rates borne by each ton of the product rose to the remarkable figure of 21*s* 0*d.*

In the absence of data as to the total cost of production per ton of any of the products specified in Table III, the respective costs of local rates and "social charges" for three of the examples are in Table IV expressed as percentages of the average quoted prices in the years 1913 and 1923 of typical products of the kinds concerned.

TABLE IV.

Costs of Local Rates and "Social Charges" (as in Table III) expressed as percentages of average quoted prices per ton of typical products.

(A.Q.P.=Average quoted price.)

Product.	1913.				1923.			
	Local rates.	Workmen's Compensation.	National Insurance.	Total.	Local rates.	Workmen's Compensation.	National Insurance.	Total.
Steel Ship Plates (England).	%	%	%	%	%	%	%	%
A.Q.P.: £ s. d.								
1913 7 17 9	·84	·56	·21	1·61	1·80	·83	·79	3·42
1923 10 1 1								
Steel Rails (Heavy).								
A.Q.P.: £ s. d.								
1913 6 13 0	·69	·25	·12	1·06	1·98	·35	·53	2·86
1923 9 9 8½								
Tinplates (I.C. 20″ × 14″).								
A.Q.P.: £ s. d.								
1913 13 11 6	·52	·12	·19	·83	1·05	·22	·52	1·79
1923 24 2 5								

3. Cumulative Cost of Local Rates and "Social Charges."

In order to illustrate the *cumulative effect* of these charges per ton of steel *from the coal and ore to the finished product*, reference may be made to a table supplied to the Committee in evidence on behalf of the National Federation of Iron and Steel Manufacturers. The table, which is given below (Table V), shows that, in the instances quoted, the cumulative totals ranged from 8*s.* 6*d.* to 11*s.* 8*d.* per ton in 1923, as compared with amounts varying between 2*s.* 10*d.* and 4*s.* 4*d.* in the year 1913. This ascertainment embraces, it is understood, the total amount of the local rates and "social charges" attributable to the materials involved in the manufacture of one ton of finished steel, commencing with the raising, washing and coking of coal and the raising of the ore and limestone; proceeding to the production of pig iron including the proportions of the iron ore, coke and limestone incidental thereto; the production of ingot steel including the requisite pig iron and other material; the production of semi-finished steel including the ingots; and reaching finally the ton of finished steel.

TABLE V.

Cumulative Cost of Local Rates and "Social Charges" per ton of finished steel, 1913 and 1923.

(From coal and ore to the finished product.)

Firm and Product.	1913.				1923.			
	Local rates.	Workmen's Compensation.	National Insurance.	Total.	Local rates.	Workmen's Compensation.	National Insurance.	Total.
	s. d.	*s. d.*	*d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d*
Firm A. (*Black c/a Sheets*) ..	2 5	1 5	6	4 4	3 6	2 6	2 8	8 9
Increase per cent.					(45)	(77)	(433)	(102)
Firm B. (*Steel plates*) ..	2 2	1 4	6	4 1	6 0	2 6	2 7	11 1
Increase per cent.					(177)	(88)	(417)	(171)
Firm C. (*Steel rails*)	1 10	0 8	4	2 10	5 9	1 5	1 4	8 6
Increase per cent.					(214)	(112)	(300)	(200)
Firm D. (*Combined products*)	1 9½	0 11½	6	3 3	6 1	1 7	2 7	10 3
Increase per cent.					(240)	(65)	(417)	(215)
Firm E. (*Steel plates*) ..	Not available.				4 4	2 3	3 2	9 9
Firm F. (*Tin plates*) ..	2 3½	0 6	8	3 5½	6 5	1 11½	3 3½	11 8
Increase per cent.					(180)	(292)	(394)	(237)

Note.—Iron and steel manufacture, and mining and quarrying were not "insured trades" for Unemployment Insurance before 1923. This partly accounts for the large increase in National Insurance costs between 1913 and 1923, as an increase of 433 per cent. was shown in respect of National Insurance.

As regards tinplates, the Chairman of a very large company, with a normal production of tinplates exceeding 7,000 tons per week, stated in December, 1926, that local rates and social service charges on the company's tinplate works and sheet works, together with the steel works supplying the necessary material, represented 5s. per ton on the company's full output of tinplates and sheets, the amount being almost equally divided between local rates and the social service charges. The figures of actual payments were given as £54,000 for local rates, £11,000 for Health Insurance, £19,000 for Widows' and Orphans' Pensions, £18,000 for Unemployment Insurance, and £19,000 for Workmen's Compensation Insurance.

In Table VI, the above *cumulative costs* in respect of steel plates, steel rails and tin plates are expressed as percentages of the average quoted prices of typical products, as in Table IV

TABLE VI.

Cumulative Cost of Local Rates and "Social Charges" (as in Table V) expressed as percentages of average quoted prices per ton of typical products.

(A.Q.P.=Average quoted price.)

Product.	1913.				1923.			
	Local rates.	Workmen's Compensation.	National Insurance.	Total.	Local rates.	Workmen's Compensation.	National Insurance.	Total.
Steel Ship Plates (England).	%	%	%	%	%	%	%	%
A.Q.P.: £ s. d.								
1913 7 17 9	1·37	·85	·32	2·59	2·98	1·24	1·29	5·51
1923 10 1 1								
Steel Rails (Heavy).								
A.Q.P.: £ s. d.								
1913 6 13 0	1·38	·50	·25	2·13	3·03	·75	·70	4·48
1923 9 9 8½								
Tinplates (I.C. 20″×14″).								
A.Q.P.: £ s. d.								
1913 13 11 6	·84	·18	·25	1·27	1·33	·41	·68	2·42
1923 24 2 5								

In respect of *cotton spinners and manufacturers* some few particulars, based on the experience of several Lancashire mills, are available as to the cumulative incidence of local rates. In the case of the spinners local rates have increased by 184 per cent. since pre-war days resulting in the cost of rates per lb. of yarn rising from under ·13 of a penny in 1912–13 to over ·35 of a penny in 1926–27, or an increase of 170 per cent.* In the case of the manufacturer, to whom the yarn passes, it is stated that local rates have increased by 173 per cent. and upwards. In one case, rates were ·4 per cent. of turnover in

* According to the Annual Report of the Oldham Master Cotton Spinners' Association for 1926, the percentage increases over 1914 in the cost per lb. of yarn of local rates and social charges in the case of an individual first-class mill in the Oldham Borough were as follows: Local Rates, 174 per cent.; Income Tax (Schedule A only), 277 per cent.; Health, Pensions and Unemployment Insurance, 640 per cent.

1914 and ·96 per cent. in 1926–27 (estimating on turnover for the previous year which was rather larger than 1914) representing an increase of 240 per cent. on cost prices. Assuming by way of example that this particular mill were making cloth which for a piece of 100 yards (containing, say, 16 or 17 lb. of yarn), would sell to-day at 50*s.* the piece, the rates paid by the manufacturer would represent nearly 6*d.* on that piece. The rates already paid by the spinner of the yarn would be (at ·35 of a penny a lb.) another 6*d.* Thus the total would be 1*s.* on the piece or 2 per cent. on the cost of the cloth at this stage. No particulars are available as to what the cumulative percentage would amount to after the bleaching, dyeing, printing or other finishing processes were taken into account.

4. Incidence of Local Rates in the Engineering and Shipbuilding Industries on the Clyde.

The table on p. 492 is based on information furnished by sixty-three firms in the engineering and shipbuilding and marine engineering industries in the Glasgow assessment area. It relates to the years 1914–15 and 1924–25 and shows for each year the assessed rentals, the amount of rates levied, the rate in the £, the number of persons employed, and the rates per head of persons employed, and it also expresses each of these categories in 1924–25 as a percentage of the corresponding categories in 1914–15. The rates included are municipal, poor, and school rates.*

Taking the sixty-three firms together, assessments rose by 55·5 per cent., the amount of rates by 177·1 per cent., and the rate in the £ by 78·2 per cent., while, since the number of employees decreased by 33·6 per cent., the amount of rates per head rose by 317·4 per cent.† There was a difference in the incidence of the rates between the smaller and the larger firms. Taking firms under

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* The total assessed rentals, and the total amount of rates levied in 1925–26, were somewhat lower than in 1924–25, and the totals for 1926–27 considerably higher, but the data for calculating the amounts per head of persons employed in the latter year are not available.

† In the cases here discussed the increase in the amount of local rates per head of persons employed was due to depression in trade, but in certain cases such rise may not be inconsistent with prosperity. The re-organisation and improvement of a factory (as for example by the introduction of new labour-saving machinery) may lead to an increase in the assessment and a rise in the amount of rates payable. Owing to this latter amount being distributed over the same or even a smaller number of men, the amount paid per individual employee will be greater, but at the same time the output may be larger and the prosperity of the factory enhanced.

£1,000 assessed rental in 1914–15, the increase in assessments was 50 per cent., in rates 158·4 per cent., and, in the rate in the £, 72·2 per cent., while in the case of larger firms the increase in assessments was 56·8 per cent., in rates 181·6 per cent., and, in the rate per £, 79·7 per cent. It is not known, in either case, to what degree the increase in assessments was due to extensions of premises or simply to revaluation. The difference is still more marked when the rates are measured per head of employees, the increase being 248·1 per cent. for the smaller firms and 332·4 per cent. for the larger. This was due to the fact that the employees of the smaller firms decreased by only 25·8 per cent., while those of the larger firms decreased by 34·9 per cent.

Examination of the table reveals a more material difference, namely, that between general engineering firms on the one hand and shipbuilding and marine engineering firms on the other. In 1914–15 there was no serious difference between the rates in the £ which were 6*s.* 5·5*d.* for general engineering firms and 6*s.* 8·5*d.* for shipbuilding and marine engineering firms; in 1924–25, also, the rates were fairly close together at 11*s.* 5·5*d.* and 11*s.* 11·6*d.*, respectively. In the intervening period the assessments of general engineering firms increased by 45·9 per cent., the rates by 159 per cent., and the rate in the £ by 77·4 per cent., whereas for shipbuilding and marine engineering firms the percentages were 66·6, 197·0, and 78·4, respectively. At the same time, the number of employees in the general engineering works decreased by 26·5 per cent., and the number in shipbuilding and marine engineering works decreased by 38·6 per cent. Consequently, while the amount of rates per head of persons employed increased by 252·4 per cent. in the case of general engineering firms, it increased by 383·8 per cent. in the case of shipbuilding and marine engineering firms.

The 51 general engineering firms have been divided into five classes, according to the amount of the assessment in 1914–15. In that year the highest rate in the £ was levied on firms assessed at £250 and under £500 rental, and the same class also showed the highest rate in 1924–25. This class also showed the greatest increases in assessment, in the amount of rates, and in the rate per £. The lowest average rate in the £ in 1924–25 was levied on the class of firms assessed on £1,000 rental and upwards, and in 1924–25 the rate levied on this class was only 0·6 per cent. above the lowest average rate, that on firms under £100 rental. The lowest increases in assessments and in total rates occurred in the class of firms with rentals between £500 and £1,000; the lowest increase in the rate in the £ occurred in the class of firms under £100 rental. How far these differences are purely accidental, it is impossible to say. They are presumably not due to differences in the basis of assessment, as the firms were all situated in the same assessment area, the table

indicates a tendency to the lighter rating of the very large and of the very small engineering firm. For firms under £100 rental in 1914–15 the assessment was £2·08 per head, and, though it rose to £4·33 for firms with rentals of £250 and under £500, it was £3·14 for firms of £1,000 rental and upwards. The figures for the same groups of firms in 1924–25 were £3·41, £8·38, and £7·01.

Reckoning per head of persons employed, rates in 1914–15 were lowest for firms of less than £100 rental (13*s.* 8·4*d.*); next came firms with rentals of £100 and under £250, then firms with rentals of £1,000 and over, then firms with rentals of £500 and under £1,000, while firms with rentals of £250 and under £500 (noted above as paying the highest rate in the £) paid the highest rate (30*s.* 6·3*d.*) per head. In 1924–25, the classes of firms were arranged in the same order, although the reduction in the number of employees was not at the same rate in each class. Firms with rentals under £100 lost only 8·5 per cent. of their employees and their rates rose by 179·7 per cent. per head; firms with rentals of £250 and under £300 lost 20·3 per cent. of employees and rates per head increased by 249·5 per cent.; there was a loss of 25·8 per cent. in employees by firms of £1,000 rental and over and rates per head rose by 252 per cent.; the less large firms with rentals of £500 but under £1,000 lost 31·9 per cent. of their employees and rates per head increased by 256·6 per cent.; and, finally, the firms whose rentals were at least £100 but under £250 had 30·7 per cent. fewer employees in 1924–25 than in 1914–15, and their rates per head increased by 291·7 per cent. The effects of bad trade would naturally strike differently the makers of different classes of machinery, and the different rates of employment in the five groups of firms would, therefore, depend upon the make-up of the several groups.

Turning to the shipbuilding and marine engineering firms, it will be seen that the larger firms of £1,000 rental and over were relatively more lightly burdened by rates than the smaller firms, whether the burden be measured by the rate in the £ or by rates per head of persons employed. In 1924–25 the assessments of the smaller firms were nearly doubled, but the rate in the £ was only increased by about 41 per cent.; in the case of the larger firms assessments were increased by less than two-thirds, but the rate in the £ was increased by 81 per cent. The result was that the rates in the £ were brought practically to the same level in both classes. The smaller firms for which information was furnished lost only 8·4 per cent. of their workpeople, so that the increase in rates per head was 205 per cent.; the larger firms lost 39·5 per cent. of their workpeople and the increase in rates per head was 393·3 per cent.

Local Rates on Engineering and Shipbuilding Undertakings in the Glasgow Assessment Area.

Firms.	1914-15.						1924-25									
	No. of Firms.	Amount of Assessments.	Amount of Rates.	Rate in the £.	Persons employed.	Rates per head.	Amount of Assessments.		Amount of Rates.		Rate in the £.		Persons employed.		Rate per head.	
							Actual.	1914-15.	Actual.	1914-15.	Actual.	1914-15.	Actual.	1914-15.	Actual.	1914-15.
		£	£	s. d.		s. d.	£	%	£	%	s. d.	%		%	s. d.	%
General Engineering.																
Under £100	8	498	161	6 5·6	235	13 8·4	734	147·4	412	255·9	11 2·7	173·6	215	91·5	38 3·9	279·7
£100 and under £250 ..	9	1,800	578	6 5·1	619	18 8·1	2,728	151·6	1,569	271·5	11 6·0	179·0	429	69·3	73 1·8	391·7
£250 ,, ,, £500 ..	8	2,795	986	7 0·7	646	30 6·3	4,314	154·3	2,747	278·6	12 8·8	180·4	515	79·7	106 8·2	349·5
£500 ,, ,, £1,000 ..	14	9,374	3,081	6 6·9	2,335	26 4·7	12,806	136·6	7,487	243·0	11 8·3	177·8	1,591	68·1	94 1·4	356·6
£1,000 ,, ,, over ..	12	33,394	10,643	6 4·5	9,470	22 5·7	49,246	147·5	27,802	261·2	11 3·5	177·1	7,029	74·2	79 1·3	352·0
Total	51	47,861	15,449	6 5·5	13,305	23 2·7	69,828	145·9	40,017	259·0	11 5·5	177·4	9,779	73·5	81 10·1	352·4
Shipbuilding and Marine Engineering.																
£600 and under £1,000 ..	3	2,295	969	8 5·3	557	34 9·7	4,559	198·2	2,707	279·4	11 10·5	140·7	510	91·6	106 1·9	305·0
£1,000 over	9	39,418	13,034	6 7·4	18,464	14 1·4	64,940	164·7	38,878	298·3	11 11·7	181·0	11,165	60·5	69 7·7	493·3
Total ..	12	41,713	14,003	6 8·2	19,021	14 8·7	69,499	166·6	41,585	297·0	11 11·6	178·4	11,675	61·4	71 2·9	483·8
Grand Total ..	63	89,574	29,452	6 6·9	32,326	18 2·7	139,327	155·5	81,602	277·1	11 8·6	178·2	21,454	66·4	76 0·9	417·4
Under £1,000	42	16,762	5,775	6 10·7	4,392	26 3·6	25,141	150·0	14,922	258·4	11 10·4	172·2	3,260	74·2	91 6·6	348·1
£1,000 and over	21	72,812	23,677	6 6·0	27,934	16 11·4	114,186	156·8	66,680	281·6	11 8·2	179·7	18,194	65·1	73 3·6	432·4

RAILWAY TRANSPORT AS A FACTOR IN COST.

Annex A, on pages 499-500, shows the level of railway rates in operation at the beginning of 1925 for the carriage of the various classes of merchandise by goods train between stations in Great Britain; and the tables on pages 501-17 show the rates charged on one ton of each of a number of specified articles for carriage between certain selected points in 1914 and at the beginning of 1925 respectively. The articles were chosen by the Committee as being typical in relation to the industries selected for special consideration*. They include both important materials of manufacture and also finished goods destined either for home consumption or for export. In relation to each article the Ministry of Transport (in consultation with the Board of Trade and the Committee) selected a limited number of the most important "hauls," i.e. journeys connecting the points between which important traffic in the article under consideration habitually passes. Inspection of the tables will indicate that the predominant increase in the rates tabulated was somewhat over 50 per cent. (say 52½ per cent.) above the level of 1914. The general level of railway rates as a whole was somewhat higher, say 54 per cent. above 1914.†

In order to express the incidence of railway rates in relation to the total cost or selling price of individual articles, it is necessary to estimate for each of the selected articles separately the average railway charge for carrying, say, one ton of that article for the average "haul" applicable to it, or, where the true average haul cannot be ascertained, for a specified distance. This has been done in the following paragraphs (*a*) and (*b*); and in paragraph (*c*) an endeavour is made to relate some of the charges thus obtained to the value of the goods concerned.

(a) *Goods for which particulars of "average hauls" are ascertainable.*

The railway statistics compiled by the Ministry of Transport show for a number of classes of goods the average length of haul, and enable the average charge for railway transport over this length of haul to be calculated. Particulars of the average haul in 1914 are not available, but the results of applying the 1914 rates to the 1925 average hauls have been calculated for purposes of comparison. It should be explained that the "average hauls" are calculated on the basis of traffic returns for particular months during the years 1921-24, and may, therefore, not be absolutely representative of the average haul for 1925.

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* *See* footnote, p. 1.

† Notice has been given of increases in railway rates, to come into operation on 1st February, 1927, the effect of which will be to raise the general level to about 64 per cent. over the 1914 level.

The results of the calculation are given below :—

A. *Average railway charges per ton for the ascertained average length of haul for certain commodities.*

Commodity. S to S = Station to station. C and D = Collected and delivered.	Average length of haul.	Average Charge per ton at rates in force in	
		1914.	January, 1925.
	Miles.	Per ton. s. d.	Per ton. s. d.
Coal—shipment	26	1 4	2 2
land sale*	56	3 0	4 8
Pig iron	48	3 9	5 10
Iron and steel ingots	41	3 7	5 7
Iron ore	44	2 3	3 3
Machinery†—Class I—S to S	85	13 1	20 2
C and D	134	22 6	34 4
Class II—S to S	59	10 1	15 7
C and D	125	25 6	38 9
Class III—S to S	65	10 4	16 0
C and D	138	31 2	47 3
Cotton, raw—C and D	41	9 9	15 2
Wool, raw—C and D	107	21 6	32 9
Leather, dressed—C and D	110	26 1	39 8
Deals, battens and boards (measurement weight)	63	8 2	12 7
Pit props (machine weight)	47	4 8	7 4
Alkali	66	7 1	11 0
Earthenware—C and D	122	28 6	43 3

(b) *Goods for which average length of haul is not ascertainable.*

For these classes of goods, another and less accurate method of estimate has to be employed. In the first place the lengths of haul quoted in the tables in Annex B for a particular article are added together, and the tonnage rates applicable to those hauls are also added together. One total is then divided into the other and the quotient gives as nearly as is ascertainable the rate per ton-mile.

* The rates shown are the approximate average rates for "land sale coal" as a whole.

†Class I consists chiefly of heavy machines and machinery such as bases and beds of machines, brickmaking machines, hydraulic engines, etc.

Class II—Machinery (packed), certain agricultural machines and implements, electrical plant and lighter machinery.

Class III—Machinery (not packed) and certain descriptions of light, bulky and expensive machines.

There are no materials for estimating the precise average haul, but the ascertained ton-mile rates have been applied to an arbitrary haul of 100 miles. It is believed that in the case of such important classes of goods as cotton tissues, woollen and worsted tissues, and boots and shoes, this assumed haul is not very far from the true average. Thus the *unweighted* average of the typical hauls quoted in the tables for these three classes of goods are 108, 109 and 117 miles respectively.

In making the above calculation of the rate per ton-mile, a good many special conditions have had to be allowed for or ignored (e.g. some of the rates given are " station to station," others " collected or delivered," some are for particular quantities, e.g. 2-ton lots, and there are other qualifications noted in the tables). Generally speaking, the rate selected, where there has been a choice, has been that at which, so far as can be judged, the predominant amount of the traffic passes. If in some cases a wrong choice has been made, it is not believed that any error thus introduced into the results can be material, and in any case it rarely affects the comparison between 1914 and 1925.

The following is the result of the calculations so far as relates to goods for which the data make an estimate possible :—

B. *Average railway charges per ton for* 100 *mile haul for certain commodities.*

Commodity.	Average charge per ton at rates in force in	
	1914.	1925 (January).
	s. d.	*s. d.*
E. Cotton yarns	17 2	26 2
E. Cotton piece-goods	18 5	28 2
E. Woollen and worsted yarns	20 0	30 5
E. Woollen and worsted tissues	22 0	33 6
H. Leather (undressed)	23 11	36 5
E. Boots and shoes	23 3	35 3
H. Raw rubber	26 2	39 8
H. Dyes and dye extracts	33 6	50 7
H. Dyewoods and dyewood extracts ..	18 4	28 1
E. Electric cables	19 10	30 1

E = for export.
H = for home consumption.

(c) *Relation of charges to value of goods.*

In order to show the relation of the charges exhibited in the above tables to the value of the goods carried, the following calculation has been made for a few typical articles of importance in British export trade. The figures in the first two columns are obtained from the Board of Trade Export Statistics, but in the case of textiles, and boots and shoes, it has been necessary to apply a factor to convert yards and dozens of pairs into tons.

Commodity.	Export value per ton.		Cost of carriage by rail per ton.		Cost of carriage as a percentage of export value.	
	1913.	1924.	1914.	Jan., 1925.	1914.	Jan., 1925.
	A. *For actual average length of haul.*					
	£ s. d.	£ s. d.	s. d.	s. d.	Per cent.	Per cent.
Coal (shipment) ..	0 14 0	1 3 6	1 4	2 2	9·5	9·22
Pig iron	4 6 0	6 17 6	3 9	5 10	4·36	4·24
Iron and steel ingots, etc.	12 10 0	15 5 0	3 7	5 7	1·43	1·83
Machinery	49 0 0	96 0 0	11 2*	17 3*	1·14	·90
	B. *For a haul of* 100 *miles.*					
Cotton piece-goods ..	160 0 0	410 0 0	18 5	28 2	·58	·34
Woollen and worsted tissues	490 0 0	700 0 0	22 0	33 6	·22	·24
Boots and shoes ..	260 0 0	450 0 0	23 3	35 3	·45	·39

While these figures bring out in a striking manner the fact that the importance of railway rates to manufacturers and traders is very much greater in the case of heavy and cheap articles than in that of the finer and more expensive products, they do not by themselves afford an accurate measure of the total cost of railway transport which is incurred in respect of each article.

In the first place the figures relating to textiles and boots and shoes only measure the cost of carrying a ton of the finished articles for 100 miles by rail, whereas the actual average haul may be more or less than 100 miles. Much more important than this

* These are average S to S rates quoted for short hauls of about 70 miles and covering all classes of machinery. For longer hauls, averaging about 130 miles, C and D rates are often quoted, and the cost in these cases is considerably higher than that given in the table.

comparatively minor cause of error is the fact that none of the figures include the cost of carrying the materials of which the article is made to the place of manufacture. How great the relative importance of this factor may be is clearly brought out by the following examples

Boots and Shoes.—A calculation relating to boots and shoes has been made in consultation with the Manager of the United Tanners' Federation. This calculation showed that while the total charge for carrying a ton of boots by rail from factory to destination was £1 18*s.* 7*d.*, the railway charges on the materials required for making that ton of boots (hides, leather and tanning materials) amounted to no less than £6 5*s.* 0*d.*, or more than three times as much. The aggregate cost of railway carriage amounted to over 1·6 per cent. of the retail selling value of the boots, of which aggregate the cost of carrying the boots themselves to their market only accounted for one-quarter (or ·4 per cent. of the retail selling value).

Cotton Piece-Goods.—A second example is afforded by cotton piece-goods for which certain statistical data compiled by the Calico Printers' Association are available (see Annex C (1), page 517). From these figures, it appears that on a piece of cotton cloth, the selling price of which in 1926 was 266·63 pence, the cost of carriage of raw cotton from Liverpool to Oldham was ·6075 pence, which was ·227 per cent. of the price of the finished cloth, or 12·32 per cent. of the total cost of transport. The cost of railway carriage of the yarn from Oldham to the weaving sheds in Burnley and of the grey cloth from Burnley to the merchant in Manchester amounted to 1·045 pence, i.e., ·392 per cent. of the price of the finished cloth, or 21·20 per cent. of the total cost of transport. The cost of conveying the cloth from Manchester to the finishers at Glasgow and back again was 2·835 pence, being 1·064 per cent. of the price of the finished cloth, or 57·50 per cent. of the total cost of transport. The cost of carrying the finished piece from Manchester to Birkenhead for shipment amounted to ·442 pence, and equalled ·166 per cent. of the price of the finished cloth, or 8·98 per cent. of the total cost of transport. The total cost of transport was thus 4·93 pence, or 1·85 per cent. of the price of the cloth (which compares with 2·83 per cent. in 1914), the cost of carriage of the finished cloth to the port of shipment being in both years about 9 per cent. of the total cost of transport.

Iron and Steel.—An interesting calculation of the total railway transport cost in a ton of pig iron and a ton of steel plates (manufactured on the North-East coast) was submitted by Sir Ralph Wedgwood to the Rates Advisory Committee in 1920. The calculation related to 1914 and a post-war year. In Annex C (2), pp. 518–9, the figures for 1914 are reproduced, together with the results of a calculation on the same basis for 1925. It will be seen that, in the latter year, the average railway charges per ton of Cleveland pig iron

were 23*s.* 5*d.*, or, roughly, 30 per cent. of the market price of the pig iron. But of this total only about one-quarter (6*s.* 3*d.* or, say, 8 per cent. of the price) represented the average cost of carrying the pig iron to the steel works, the remaining 17*s.* 2*d.* representing the cost of carriage of the necessary materials (coal, limestone and ironstone) to the furnaces. The total cost in 1925 of rail carriage per ton of steel plates was 30*s.* 2*d.*, or, say, 17 per cent. of the market price, but of this less than one-fifth (i.e., 5*s.* 10*d.*, or, say, 3 per cent. of the market price) was attributable to the carriage of the plates to their destination (a shipyard on the Wear), the remaining 24*s.* 4*d.* being accounted for by the carriage of pig iron, limestone, ore, coal and coke to the steel works.

In 1914 the total railway charges per ton of pig iron made in Cleveland for use in Cleveland steel works were estimated at 15*s.* or 25 per cent. of the market value, of which 4*s.*, or slightly over a quarter represented the carriage of the pig iron to steel works. The total railway charges per ton of Cleveland steel plates in 1914 were 19*s.* 3*d.* (or 14·3 per cent. of the market value), of which 3*s.* 8*d.*, or less than one-fifth, represented the cost of carriage of the plates.

A second example relating to iron and steel material is given in Annex C (3), and this shows that the average cost of conveying the completed products to destination was (both in 1914 and 1924) about half the cost of bringing the materials to the works.

Naturally, in all these calculations the percentage of cost of transport to market price varies continually with the movement of prices.

The above examples sufficiently illustrate the fact that, generally speaking, the railway transport charges on materials used in manufacture amount to a much heavier percentage of the cost of the finished goods than the cost of carrying those manufactured goods by rail to their destination in Great Britain or to the port of exportation. They also bring out clearly the great importance of the cost of coal carriage in the case of industries like iron and steel, which are largely dependent on coal. A comparison with 1914 shows that, generally speaking, the cost of railway transport bears a slightly lower relation to the value of the goods carried than immediately before the war. This is confirmed by the fact already stated that on an average railway rates have increased about 54 per cent., or rather less than the rise of wholesale prices.

ANNEX A.

LEVEL OF THE RAILWAY RATES IN OPERATION 1ST JANUARY, 1925, FOR CARRIAGE OF MERCHANDISE (INCLUDING LIVESTOCK) BY GOODS TRAINS BETWEEN STATIONS IN GREAT BRITAIN.

Description of merchandise, etc.	Rate.
	The rates in operation in 1914 with the undermentioned additions :—
Coal, coke and patent fuel (other than for blast furnaces).	50 per cent. plus flat rate of 2*d.* per ton, subject to a maximum addition of 3*s.* 6*d.* per ton.
Coal, coke and patent fuel for blast furnaces.	50 per cent. plus flat rate of 2*d.* per ton, subject to a maximum addition of 2*s.* per ton.
Traffic in Class "A" of the general railway classification (other than coal and coke)—	
Iron ore, ironstone and limestone. Burnt iron pyrites. Cinders. Hammer scale. Manganiferous iron ore. Mill cinder. Mill scale. Puddle tap. Purple ore. (For blast furnaces and steel works.)	40 per cent. plus flat rate of 2*d.* per ton, subject to a maximum addition of 1*s.* per ton.
Limestone for chemical works and glass works.	50 per cent. plus flat rate of 3*d.* per ton, subject to a maximum addition of 3*s.* per ton.
Traffic in Class "A" other than above	50 per cent. plus flat rate of 3*d.* per ton, subject to a maximum addition of 4*s.* per ton.
Traffic in Class "B" of the general railway classification (other than patent fuel)—	
Iron and steel. Ferro silicon Silico manganese. Chrome iron ore. Manganese ore. Lime for iron and steel making. Basic material Burnt limestone. Calcined dolomite limestone. (For blast furnaces and steel works.)	50 per cent. plus flat rate of 3*d.* per ton, subject to a maximum addition of 4*s.* per ton.
Traffic in Class "B" other than above	50 per cent. plus flat rate of 3*d.* per ton, subject to a maximum addition of 6*s.* per ton.

Description of merchandise, etc.	Rate.
	The rates in operation in 1914 with the undermentioned additions.
Traffic in Class "C" of the general railway classifications—	
Iron and steel	50 per cent. plus flat rate of 4*d.* per ton, subject to a maximum addition of 8*s.* per ton.
Traffic in Class "C" other than above	50 per cent. plus flat rate of 4*d.* per ton.
Traffic in Classes 1 to 5 of the general railway classification—	
Tinplates in 2-ton lots and upwards.	50 per cent. plus flat rate of 4*d.* per ton, subject to a maximum addition of 8*s.* per ton.
Traffic in Classes 1 to 5 other than above.	50 per cent. plus flat rate of 6*d.* per ton.
Rolling stock	50 per cent. plus flat rate of 4*d.* per ton.
Small parcels (as defined in Part VI of Railway Rates and Charges Orders).	50 per cent.
Returned empties	50 per cent.
Livestock—	
At "Truck" rates	50 per cent. plus flat rate of 1*s.* per truck or part truck.
At "Head" rates	50 per cent., the charge for disinfecting to be 1*s.* 6*d.* per truck.
Wagon hire	When not included in the conveyance rate the charge for wagon hire will be subject to an increase of 50 per cent.

ANNEX B.

Railway Rates in Operation on 1st January, 1925, for the Carriage of Specified Commodities between Specified Points.

(Compiled by the Ministry of Transport from particulars supplied by the Railway Companies.)

The following abbreviations are used in the tables :—

G.R.C.—General Railway Classification.
C.—Collection.
D.—Delivery.
S.—Station.
P.S.—Private Siding.
O.R.—Owner's risk.
C.R.—Company's risk.
O.W.—Owner's Wagons.
C.W.—Railway Company's Wagons.

(1) Rates for the Carriage of RAW MATERIALS from ports or centres of production to places of manufacture.

Description of Traffic.	Between.		Distance. Miles.	Rate per Ton. 1914.	Rate per Ton. January, 1925.
				s. d.	s. d.
Cotton, raw—					
In press packed bales ..	Liverpool	Bolton	27	8 4 C. or D. in Bolton ..	13 0 C. or D. in Bolton.
In bags	,,	,,	27	8 8 C. or D. in Bolton ..	13 6 C. or D. in Bolton.
In press packed bales ..	Manchester	,,	10	6 1 C. and D.	9 8 C. and D.
Wool, raw	London	Bradford	191	33 10 C. and D.	51 3 C. and D.
Wool, raw, in press packed bales.	,,	,,	191	31 0 C. and D.	47 0 C. and D.
Iron ore	Irthlingbro'	Middlesbro'	192	7 1 Seven tons per truck, P.S., and P.S. O.W.	8 1 Seven tons per truck, P.S., and P.S. O.W.
	,,	,,	192	8 1 Seven tons per truck, P.S., and P.S. C.W.	9 7 Seven tons per truck, P.S., and P.S.C.W.
	Cleator Moor	,,	124	5 10 Not less than 50 ton lots at one time. Eight tons per truck, P.S., and P.S., O.W.	6 10 Same conditions.
				6 7 Eight tons per truck, P.S., and P.S., C.W.	8 0 Same conditions.

Description of Traffic.	Between.		Distance. Miles.	Rate per Ton. 1914.			Rate per Ton. January, 1925.		
				s.	d.		s.	d.	
Iron ore	Frodingham	Rotherham	36	1	5¾	O.W., P.S. to P.S., full truck loads.	2	3	Same conditions.
				1	9¾	C.W., P.S. to P.S., full truck loads.	2	9	Same conditions.
Deals, battens and boards, as per general railway classification	Banbury	Port Talbot	143	5	3	O.W.	6	3	O.W.
	Liverpool	Sheffield	73	10	10	S. to S., 2 tons ..	16	7	S. to S., 2 tons.
				10	0	S. to S., 4 tons ..	15	4	S. to S., 4 tons.
	,,	Birmingham	90	11	2	S. to S., 2 tons ..	17	1	S. to S., 2 tons.
	Hull	,,	132	14	9	Carted in Birmingham 2 tons	21	0	S. to S., 2 tons.
				13	10	Carted in Birmingham 5 tons	19	7	S. to S., 5 tons.
	,,	Sheffield	59	9	6	S. to S., 2 tons ..	14	7	S. to S., 2 tons.
				8	8	S. to S., 4 tons ..	13	4	S. to S., 4 tons.
Dyes and dye extracts and colours, in Class 2, as per general railway classification	Manchester	Bradford	38	14	2	C. and D., 2 ton loads	21	9	C. and D., 2 ton loads.
	Deighton (for British Dyes Siding)	,,	13	9	2	C. and D., 2 tons ..	14	3	C. and D., 2 tons.
	,,	Manchester	25	12	6	C. and D.	19	3	C. and D.
Dyes, dye extracts, and colours (other than pigments) in Class 2 of G.R.C.	Manchester	Hull	91	23	9	C. and D.	33	8	C. and D.
	,,	Goole	67	21	3	C. and D.	32	5	C. and D.
	Bradford	Hull	61	15	10	C. and D.	24	3	C. and D.
	,,	Goole	41	15	10	C. and D.	24	3	C. and D.
Dyewood extracts ..	Manchester	Hull	91	15	7	S. to S., 2 ton loads ..	23	11	S. to S., 2 ton loads.
	,,	Goole	67	15	7	S. to S., 2 ton loads ..	23	11	S. to S., 2 ton loads.
Dyewoods, in Class " C " of G.R.C.	Manchester	Hull	91	12	2	S. to S., 4 tons ..	18	7	S. to S., 4 ton loads.
	,,	Goole	67	12	2	S. to S., 4 tons ..	18	7	S. to S., 4 ton loads.
	Bradford	Hull	61	8	3	S. to S., 2 tons ..	12	9	S. to S., 2 tons.
	,,	Goole	41	8	3	S. to S., 2 tons ..	12	9	S. to S., 2 tons.

Description of Traffic.	Between.		Distance. Miles.	Rate per Ton. 1914.			Rate per Ton. January, 1925.		
				s.	*d.*		*s.*	*d.*	
Hides, thoroughly salted or dried, in bales or bundles	London	Warrington	181	28	7	C. and D., C.R. ..	43	5	C. and D., C.R.
				24	2	C. and D., O.R. ..	36	9	C. and D., O.R.
				20	10	C. and D., O.R., 2 tons	31	9	C. and D., O.R., 2 tons.
	Liverpool	,,	17	4	4	S. to S.	7	0	S. to S.
Hides, except as above ..	London	,,	181	31	2	C. and D., O.R ..	47	3	C. and D., O.R.
	Liverpool	,,	17	5	2	S. to S.	8	3	S. to S.
				4	4	S. to S., O.R. ..	7	0	S. to S., O.R.
Leather, undressed, except in cases or crates	London	Northampton	65	15	7	C. and D.	23	11	C. and D.
	,,	Leicester	99	24	3	C. and D.	36	11	C. and D.
				19	1	S. to S., 2 tons ..	29	2	S. to S., 2 tons.
				23	5	C. and D., O.R., 2 tons	35	8	C. and D., O.R., 2 tons.
	Warrington	Northampton	120	26	0	C. and D., 1 ton ..	39	6	C. and D., 1 ton.
				23	5	S. to S., 2 tons ..	35	8	S. to S., 2 tons.
	,,	Leicester	100	26	0	C. and D.	39	6	C. and D.
				20	10	S. to S., 2 tons ..	31	9	S. to S., 2 tons.
Leather, except undressed, in cases or crates	London	Northampton	65	22	6	C. and D.	34	3	C. and D.
	,,	Leicester	99	29	6	C. and D.	44	9	C. and D.
				28	9	C. and D., O.R., 2 tons	43	8	C. and D., O.R., 2 tons.
	Warrington	Northampton	120	32	2	C. and D.	48	11	C. and D.
	,,	Leicester	100	30	8	C. and D.	46	6	C. and D.
Rubber, raw	London	Birmingham	111	30	4	C. and D., O.R. ..	46	0	C. and D., O.R.
				27	9	C. and D., 2 tons ..	42	2	C. D., 2 tons.
	Liverpool	,,	88	24	3	O.R., 2 tons, C. or D., in Birmingham.	36	11	Same conditions.
Blooms, billets and ingots, iron or steel	Rotherham	Rugby	83	7	9	S. to S., 4 tons ..	11	9	S. to S., 4 tons.
	London	Birmingham	111	11	5	Ten ton lots, C. or D., by truck or barge in London, and C. or D. in Birmingham	15	5	Same conditions.
	Hull	,,	132	11	5	Carted in Birmingham, 10 tons.	15	5	Carted in Birmingham, 10 tons.

Description of Traffic.	Between.		Distance. Miles.	Rate per Ton. 1914.			Rate per Ton. January, 1925.		
				s.	*d.*		*s.*	*d.*	
Pig iron	Frodingham	Warrington	91	6	5	P.S. to S., 4 ton loads	9	11	P.S. to S., 4 ton loads.
	Middlesbro'	Sheffield	96	6	3	P.S. to S., 4 ton loads	9	8	P.S. to S., 4 ton loads.
	Grangemouth	Falkirk	4 (average)	0	9½	Full wagon loads, min. 4 tons per truck	1	5	Same conditions.
Bricks	Peterboro' (Fletton)	London	75	4	2	P.S. to S., 9 tons per truck.	6	6	P.S. to S., 9 tons per truck.
Pit props, consigned direct to a mine	Grantham	Uddingston	36 (average)	5	8	Machine weight, exclusive of loading and unloading, 2 ton loads.	8	10	Same conditions.
	West Hartlepool	Cannock	175	13	3	S. to S., machine weight, 2 tons	20	3	Same conditions.
				10	11	S. to S., machine weight, 4 tons	16	9	Same conditions.
	,,	Annesley	130	9	5	Machine weight, S. to S., 2 tons	14	6	Same conditions.
	,,	Barnsley	94	9	0	Machine weight, S. to S., 2 tons	13	10	Same conditions.
	,,	,,	94	8	7	Machine weight, S. to S., 4 tons	13	3	Same conditions.
	Hull	Cannock	130	13	3	Machine weight, S. to S., 2 tons	20	3	Same conditions.
	,,	,,	130	10	11	Machine weight, S. to S., 4 tons	16	9	Same conditions.
	,,	Annesley	83	8	7	Machine weight, S. to S., 2 tons	13	3	Same conditions.
	,,	Barnsley	55	8	2	Machine weight, S. to S., 2 tons	12	7	Same conditions.
				7	10	Machine weight, S. to S., 4 tons	12	1	Same conditions.

(2) Rates for Carriage of MANUFACTURES for EXPORT.

Description of Traffic.	Between.		Distance. Miles.	Rate per Ton. 1914.	Rate per Ton. January, 1925.
Cotton yarns in Class 2, as per general railway classification	Manchester	London	Manchester, 183	26 0 C. and D.	39 6 C. and D.
	Dean Lane	,,	,,	27 5 C. and D.	41 7 C. and D.
	Hyde Road	,,	,,	26 0 C. and D.	39 6 C. and D.
	Reddish	,,	,,	26 0 C. and D.	39 6 C. and D.
	Levenshulme	,,	,,	26 0 C. and D.	39 6 C. and D.
	Cheadle	,,	,,	26 0 C. and D.	39 6 C. and D.
	Cheadle Heath	,,	,,	26 0 C. and D.	39 6 C. and D.
	Fallowfield	,,	,,	26 0 C. and D.	39 6 C. and D.
	Stockport	,,	,,	26 0 C. and D.	39 6 C. and D.
	Patricroft	,,	,,	26 0 C. and D.	39 6 C. and D.
	Weaste	,,	,,	39 4 C. and D.	59 6 C. and D.
	Mauldeth Road	,,	,,	26 0 C. and D.	39 6 C. and D.
	Manchester and above named stations	Hull	Manchester, 92	20 10 C. and D.	31 9 C. and D.
	Guide Bridge	London	Stalybridge, 184	26 0 C. and D.	39 6 C. and D.
	Bredsbury	,,	,,	26 0 C. and D.	39 6 C. and D.
	Ashton	,,	,,	26 0 C. and D.	39 6 C. and D.
	Dukinfield	,,	,,	26 0 C. and D.	39 6 C. and D.
	Stalybridge	,,	,,	26 0 C. and D.	39 6 C. and D.
	Staley and Millbrook	,,	,,	26 0 C. and D.	39 6 C. and D.
	Newton and Hyde	,,	,,	26 0 C. and D.	39 6 C. and D.
	Woodley	,,	,,	26 0 C. and D.	39 6 C. and D.
	Denton				
	Guide Bridge stations above	Hull	Stalybridge, 86	20 10 C. and D.	31 9 C. and D.

Description of Traffic.	Between.		Distance. Miles.	Rate per Ton. 1914.	Rate per Ton. January, 1925
Cotton and linen goods in Class 3 as per general railway classification	Bolton	London	195	28 7 C. and D.	43 5 C. and D.
	,,	Liverpool	27	8 8 C. or D., in Bolton only	13 6 C. or D., in Bolton only.
	,,	Hull	102	22 6 C. and D.	34 3 C. and D.
Woollen and worsted yarns in hampers, bales or boxes	Bradford	London	191	33 10 C. and D.	51 3 C. and D.
	,,	Liverpool	70	17 4 C. or D., in Bradford only	26 6 C. or D., in Bradford only.
	,,	Hull	59	15 7 C. and D.	23 11 C. and D.
	Huddersfield	London	189	33 10 C. and D.	51 3 C. and D.
	,,	Liverpool	56	16 6 C. or D., in Huddersfield only	25 3 C. or D., in Huddersfield only.
	,,	Hull	73	19 1 C. and D.	29 2 C. and D.
Woollen and worsted goods, in bales, packs or trusses	Bradford	London	191	33 10 C. and D.	51 3 C. and D.
	,,	Liverpool	70	17 4 C. or D., in Bradford only	26 6 C. or D., in Bradford only.
	,,	Hull	59	15 7 C. and D.	23 11 C. and D.
	Huddersfield	London	189	33 10 C. and D.	51 3 C. and D.
	,,	Liverpool	56	17 4 C. or D., in Huddersfield only	26 6 C. or D., in Huddersfield only.
	,,	Hull	73	19 1 C. and D.	29 2 C. and D.
Woollen and worsted goods in bales or cases for export	Leeds	Hull	50	13 0 C. and D.	20 0 C. and D.
Woollen, worsted and stuff goods in hampers, bales or boxes for export	Leeds	Liverpool	73	17 4 Not carted in Liverpool	26 6 Not carted in Liverpool.
Woollen, worsted and stuff goods	Leeds	Liverpool	73	19 1 Not carted in Liverpool	29 2 Not carted in Liverpool.
Woollens, worsted and stuff goods, in hampers, bales or boxes for export	Leeds	London	186	33 10 C. and D.	51 3 C. and D.

(23908)

Description of Traffic.	Between		Distance. Miles.	Rate per Ton. 1914.	Rate per Ton. January, 1925.
				s. d.	s. d.
Woollens, worsted and stuff goods in trusses, bales, boxes, cases, hampers or parcels	Leeds	London	186	45 1 C. and D.	68 2 C. and D.
Yarns (except silk) in bales or cases	,,	Hull	50	13 0 C. and D.	20 0 C. and D.
Yarns, cotton and linen, woollen and worsted, in hampers, bales or boxes for export	,,	London	186	33 10 C. and D.	51 3 C. and D.
Machinery, in parts, in cases	Oldham	London	188	38 3 C. and D.	57 11 C. and D.
				36 5 C. and D., O.R. ..	55 2 C. and D., O.R.
	,,	Hull	81	18 2 C. and D.	27 9 C. and D.
	,,	Liverpool	41	12 2 S. to S.	18 9 S. to S.
	,,	Manchester Docks	6	6 9 S. to S.	10 8 S. to S.
	,,	,,	,,	4 8 P.S. and S.	7 6 P.S. and S.
	Lincoln	Hull	53	13 6 C. and D.	20 9 C. and D.
	,,	Southampton	192	31 2 C. and D.	47 3 C. and D.
	Ipswich	Liverpool	230	36 5 Carted in Ipswich ..	55 2 Carted in Ipswich.
	Lincoln	London	131	25 2 C. and D.	38 3 C. and D.
	,,	Liverpool	114	22 6 Carted in Lincoln only	34 3 Carted in Lincoln only.
Machinery, not packed ..	Lincoln	Southampton	192	31 2 C. and D., O.R. ..	47 3 C. and D., O.R.
	Ipswich	Liverpool	230	38 3 O.R. Carted in Ipswich	57 11 O.R. Carted in Ipswich.
	Lincoln	London	131	25 2 O.R., C. and D. ..	38 3 O.R., C. and D.
	,,	Liverpool	114	22 6 Carted in Lincoln only, O.R.	34 3 Carted in Lincoln only, O.R.
Agricultural machines, engines, and implements	Lincoln	London	131	23 11 S. to S., exclusive of loading and unloading, min. 2 tons	36 5 Same conditions.

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Description of Traffic.	Between		Distance. Miles.	Rate per Ton.	
				1914.	January, 1925.
				s. *d.*	*s.* *d.*
Agricultural machines, engines, and implements (*contd.*)	Lincoln	London	131	20 9 Five tons, C. or D. by barge or truck in London	31 8 Same conditions.
				26 0 O.R., C. and D., for export	39 6 Same conditions.
	Ipswich	London	71	6 11 Siding to station, O.R., exclusive of labour at Ipswich, but including labour or dock haulage in London, 3 ton truck loads	10 11 Same conditions.
				10 5 Two tons, O.R., S to S., including labour in London and dock haulage in London	16 2 Same conditions
				14 5 S. to S., exclusive of loading and unloading, min. 2 tons	22 2 Same conditions.
				12 11 S. to S., exclusive of loading and unloading, min. 5 tons	19 11 Same conditions.
	,,	Southampton	158	23 5 S. to S., 3 ton lots and under 5 tons, O.R.	35 8 Same conditions.
				24 3 S. to S., O.R., 2 tons..	36 11 Same conditions.
				31 2 One ton lots and upwards, C. and D.	47 3 Same conditions.
	Lincoln	Southampton	192	26 0 S. to S., O.R., 2 ton loads	39 6 Same conditions.
	Ipswich	Liverpool	230	28 7 S. to S., O.R., 3 tons..	43 5 Same conditions.
				34 8 Any quantity carted in Ipswich	52 6 Same conditions.

Description of Traffic.	Between		Distance. Miles.	Rate per Ton. 1914.			Rate per Ton. January, 1925.		
				s.	d.		s.	d.	
Agricultural machines, engines, and implements (*contd.*)	Ipswich	Hull	176	18	8	S. to S., O.R., 4 tons per truck	28	6	Same conditions.
				34	8	In lots of less than 3 tons, carted in Ipswich	52	6	Same conditions.
	Lincoln	Hull	53	10	3	S. to S., 2-ton loads, exclusive of labour	15	11	Same conditions.
Rails (iron and steel list in Class C of the general railway classification).	Sheffield	Liverpool	72	9	6	S. to S., 2-ton lots, O.R.	14	7	Same conditions.
				8	3	S. to S., 4-ton lots, O.R.	12	9	Same conditions.
				8	3	ex - Station and delivered alongside one ship in 10-ton lots, O.R.	12	9	Same conditions.
	,,	Hull	59	7	3	S. to S., 2-ton lots, O.R.	11	3	Same conditions.
				6	11	S. to S., 4-ton lots, O.R. for export	10	9	Same conditions.
				6	6	S. to S., 10-ton lots, O.R. for export	10	1	Same conditions.
	,,	London	158	12	9	S. to S., 2-ton lots, O.R.	19	6	Same conditions.
				12	2	S. to S., 4-ton lots, O.R.	18	7	Same conditions.
				13	10	ex Station C. or D. by truck or barge in London, 10-ton lots, O.R.	21	1	Same conditions.
				15	4	ex Station C. or D. in London 2-ton lots O.R.	23	4	Same conditions.
Tools, steel	Sheffield	Liverpool	72	20	10	Not carted in Liverpool	31	9	Same conditions.
	,,	London	158	36	5	C. and D.	55	2	C. and D.

Description of Traffic.	Between		Distance. Miles.	Rate per Ton.	
				1914.	January, 1925.
Tinplates	Llanelly	Cardiff	57½	s. d. 8 8 P.S. to S.O., R.,2-ton lots	s. d. 13 4 Same conditions.
				6 1 P.S. to S.O., R.,4-ton lots	9 6 Same conditions.
	,,	Liverpool	164¾	13 0 ex-P.S. delivered alongside one ship in 10-ton lots, O.R.	19 10 Same conditions.
	,,	Hull	261¾	24 3 P.S. to S., 2-ton lots, O.R.	32 3 Same conditions.
				21 8 P.S. to S., 4-ton lots, O.R.	29 8 Same conditions.
	,,	London	202½	19 1 P.S. to S., O.R., 2-ton lots	27 1 Same conditions.
				16 1 ex P.S. including barging (within usual limits) in London, O.R., 4-ton lots	24 1 Same conditions.
	,,	Swansea	13	3 0 P.S. to S., O.R., 2-ton lots	4 10 Same conditions.
				2 6 P.S. to S., O.R., 4-ton lots (this rate was adopted in October, 1923, in lieu of 2s. 9d. same conditions).	4 1 Same conditions.
	Machen	Cardiff	12¼	3 8 P.S. to S., O.R., 2-ton lots	5 10 Same conditions.
	,,	Liverpool	157	13 0 ex P.S., delivered alongside one ship in 10-ton lots, O.R.	19 10 Same conditions.
	,,	Hull	236½	23 5 P.S. to S., O.R., 2-ton lots.	31 5 Same conditions.
				20 10 P.S. to S., O.R., 4-ton lots	28 10 Same conditions

Description of Traffic.	Between		Distance. Miles.	Rate per Ton					
				1914.			January, 1925.		
				s.	d.		s.	d.	
Tinplates—*contd.*	Machen	London	148¾	17	4	P.S. to S., O.R., 2-ton lots	25	4	Same conditions.
				16	1	ex P.S., including barging (within usual limits) in London O.R., 4-ton lots	24	1	Same conditions.
	"	Swansea	46	8	8	P.S. to S., O.R., 2-ton lots	13	4	Same conditions.
				5	2	P.S. to S., O.R., 4-ton lots	8	1	Same conditions.
Earthenware, packed in casks or crates and skeleton cases	Stoke	London	145	27	4	C. and D.	41	6	C. and D.
				26	0	C. and D., O.R. ..	39	6	C. and D., O.R.
	"	Hull	121	23	5	C. and D.	35	8	C. and D.
				22	6	C. and D., O.R. ..	34	3	C. and D., O.R.
	"	Liverpool	51	16	6	Collected in Stoke and delivered alongside ship in Liverpool.	25	3	Same conditions.
Cables, electric	St. Helens	"	10	7	0	C. or D. in St. Helens	11	0	C or D. in St. Helens.
	"	Hull	116	26	10	C. and D.	40	9	C. and D.
	"	London	191	34	1	C. and D.	51	8	C. and D.
	Prescot	Liverpool	7	6	1	P.S. and S., 2 tons ..	9	8	P.S. and S., 2 tons.
				4	2	4-ton lots, ex P.S., and delivered alongside ship in Liverpool	6	9	4-ton lots, ex P.S. and delivered alongside ship in Liverpool
	"	Hull	119	24	7	ex P.S., and delivered in Hull, O.R., 4-ton lots	37	5	Same conditions.
	"	London	195	26	0	4-ton lots, P.S. and C. or D. in London, O.R.	39	6	Same conditions.

Description of Traffic.	Between		Distance. Miles.	Rate per Ton. 1914.			Rate per Ton. January, 1925.		
				s.	d.		s.	d.	
Boots and shoes, in casks, cases or boxes.	Leicester	Liverpool	116	23	5	C. or D., in Leicester..	35	8	C. or D., in Leicester.
	,,	London	99	26	8	C. and D.	40	0	C. and D.
	,,	Southampton	134	34	8	C. and D.	52	6	C. and D.
	,,	Hull	112	29	3	C. and D.	44	5	C. and D.
	Northampton	Liverpool	131	24	3	C. or D., in Northampton.	36	11	C. or D., in Northampton
	,,	London	63	23	3	C. and D.	35	5	C. and D.
	,,	Southampton	141	26	0	C. and D.	39	6	C. and D.
	,,	Hull	136	29	6	C. and D.	44	9	C. and D.
Alkali, in Class "C" as per list in general railway classification	Widnes	Liverpool	11	3	11	P.S. and S., less lots than 2-ton	6	3	Same conditions.
				3	6	P.S. and S., 2-ton lots	5	7	Same conditions
				3	4	P.S. and S., 4-ton lots	5	4	Same conditions.
	,,	London	187	17	4	P.S. and S., 2-ton lots	26	4	Same conditions
				13	0	P.S. and S., 4-ton lots	19	10	Same conditions.
	,,	Hull	117	20	10	C. and D.	31	9	C. and D.
				10	5	P.S. and S., 4-ton lots	16	0	Same conditions.
	Northwich	Liverpool	31	6	1	P.S. and S., 2-ton lots	9	6	Same conditions.
				5	2	P.S. and S., 4-ton lots	8	1	Same conditions.
				4	9	P.S. and S., 10 tons ..	7	6	Same conditions.
	,,	London	171	23	5	C. and D.	35	8	C. and D.
				17	4	P.S. and S., 2-ton lots	26	4	Same conditions.
				13	0	P.S. and S., 4-ton lots	19	10	Same conditions.
	,,	Hull	122	14	9	P.S. and S., 2-ton lots	22	6	Same conditions.
				10	5	P.S. and S., 4-ton lots	16	0	Same conditions.

(3) Rates for Carriage of Traffic for "Home" Trade.

Description of Traffic.	Between		Distance. Miles	Rate per Ton. 1914	Rate per Ton. January, 1925.
				s. d.	*s. d.*
Cotton, raw, in press-packed bales.	Liverpool	Oldham	41	9 6 S. to S.	14 9 S. to S.
Yarns, in class 2 of the general railway classification	Oldham	Burnley	26	11 3 C. and D.	17 5 C. and D.
Cotton cloth, unbleached ..	Burnley	Manchester	28	12 7 C. and D.	19 5 C. and D.
				11 3 C. and D., 2-ton loads	17 5 C. and D., 2-ton loads.
Cloth, bleachers, in boxes .	Manchester	Bolton	10	3 1 S. to S. 2 tons	5 2 S. to S., 2 tons
Cotton and linen goods ..	Manchester	Bolton	10	7 3 C. and D., 2 tons, on Flats	11 5 C. and D., 2 tons on Flats
				7 3 2 tons, C. or D., in Manchester	11 5 Same conditions.
Cotton and linen goods for shipment to foreign ports,	Manchester	Liverpool	30	7 1 S. to S.	11 2 S. to S.
Woollen, worsted and stuff goods and woollen cloth in trusses, bales or packs, boxes, hampers or parcels	Bradford	London	191	45 1 C. and D. ..	68 2 C. and D.
	Leeds	..	186	45 1 C. and D.	68 2 C. and D.
	Huddersfield	..	191	45 1 C. and D.	68 2 C. and D.
Tools, steel, carpenters, coopers, edge, joiners, masons and shipwrights	Sheffield	Glasgow	245	41 7 C. and D.	62 11 C. and D.
Electric insulators	Stoke	Birmingham	45	12 1 C. and D., O.R. ..	18 8 C. and D., O.R.
Electric cable	Woolwich	Birmingham	127	26 0 C. and D., O.R. ..	39 6 C. and D. O.R.
				23 5 C. and D., O.R., 4-ton, loads	35 8 Same conditions.
Tinplates	Llanelly	Birmingham	152	13 0 ex P.S., delivered within usual limits at Birmingham, 2-ton lots, O.R.	19 10 Same conditions.

Description of Traffic.	Between		Distance. Miles.	Rate per Ton.	
				1914	January 1925.
Rails (iron and steel list in Class "C" of the general railway classification)	Machen	Birmingham	110	s. d. 12 2 ex P.S. delivered within usual limits at Birmingham, 2-ton lots, O.R.	s. d. 18 7 Same conditions.
	Frodingham	London	169	15 7 P.S. and S., 2-ton lots, O.R.	23 7 Same conditions.
				13 0 P.S. and S., 4-ton lots, O.R.	19 10 Same conditions.
				15 7 ex P.S., collected or delivered by truck or barge in London, 10-ton lots, O.R.	23 7 Same conditions.
				18 2 ex P.S., collected or delivered in London, 2-ton lots, O.R.	26 2 Same conditions.
Rails, iron and steel, railway or tramway.	Sheffield	Birmingham	76	10 5 S.S., O.R., 2 tons ..	16 0 Same conditions.
				8 8 S.S., O.R., 4 tons ..	13 4 Same conditions.
	Middlesbro'	..	171	17 4 Two tons, O.R., C. or D., in Birmingham only.	25 4 Same conditions.
				14 9 Four tons, O.R., C. or D., in Birmingham only.	22 6 Same conditions.
				13 0 S. to S., O.R., 10 tons	19 10 Same conditions.

(4) Rates for the Carriage of COAL for SHIPMENT

From—		TO CARDIFF DOCKS, G.W. RLY.			TO BARRY DOCKS, G.W. RLY.	
Name of Colliery.	Distance. Miles.	Rate in operation in 1914. Per ton.	Rate in operation, January, 1925. Per ton.	Distance Miles.	Rate in operation in 1914. Per ton.	Rate in operation, January, 1925. Per ton.
		s. d.	s. d.		s. d.	s. d.
In O.W. from Messrs. Powell Duffryn Steam Coal Co., Ltd., Collieries, exclusive of Tipping, etc., charges—						
Blaenant	28½	1 $7\frac{51}{180}$·944	2 8	32	1 $7\frac{51}{180}$·944	2 8
River Level	22½	1 $0\frac{988}{1000}$·9975	1 10	26¼	1 $0\frac{988}{1000}$·9975	1 10
Middle Duffryn Junction with Powell Duffryn Lines	21¼	1 $0\frac{7}{32}$·219	1 8	25	1 $0\frac{7}{32}$·219	1 8
Lower Duffryn	20¼	0 $11\frac{583}{600}$·704	1 8	24	0 $11\frac{583}{600}$·704	1 8
Penallta	15	0 8·145	1 2	20¾	0 8·145	1 2
Pengam	16¼	0 8·824	1 3	21¾	0 8·824	1 3
Britannia	16½	0 8·96	1 3	22¼	0 8·96	1 3
Gilfach	17¼	0 9·367	1 4	22¼	0 9·367	1 4
Bargoed	17¼	0 9·367	1 4	22½	0 9·367	1 4
Elliot	19¼	0 10·453	1 6	24½	0 10·453	1 6
Groesfaen and Penygarreg	19½	0 10·585	1 6	24¾	0 10·585	1 6
Ogilvie	21	0 11·403	1 7	26½	0 11·403	1 7
New Tredegar	21¼	0 11·539	1 7	26¾	0 11·539	1 7
Maerdy	24	1 1·032	1 10	28½	1 1·032	1 10
		Tyne Docks—				
Holmside Colliery (Pelton)—exclusive of tipping and all dock charges	12½	1 2½·500	2 0			
		Burntisland—				
Fife Coal Coy's Mary Pit (Kelty)—						
Railway company's wagons	16	1 $3\frac{19}{12}$·833	2 2			
Owners' wagons	—	1 $0\frac{3}{12}$·333	1 9			

(5) Rates for the Carriage of COAL—(HOUSEHOLD, INDUSTRIAL AND GAS).

To	Distance. Miles.	ALIWARKE MAIN COLLIERY.			
		Rates per ton in Owners' Wagons.		Wagon Hire per ton.	
		1914.	January, 1925.	1914.	January, 1925.
		s. d.	s. d.	s. d	s. d.
Sheffield—					
Park Station	7¾	1 0	1 8	0 4½	0 7
Harvest Lane	8½	1 1	1 10	0 4½	0 7
Neepsend Gas Sgd.	8½	1 1	1 10	0 4½	0 7
Birmingham—					
Hockley, G.W.	153½	4 10	7 5	1 0	1 6
L.M. & S.; L. & N.W.					
Banbury Street	126¾	4 6	6 11	1 0	1 6
Curzon Street	126¾	4 6	6 11	1 0	1 6
Hagley Road	126	4 11	7 7	1 0	1 6
Harborne	127	4 11	7 7	1 0	1 6
Monument Lane	124¾	4 9	7 4	1 0	1 6
Windsor Street	125¾	4 6	6 11	1 0	1 6
Windsor Street (Gas Siding)	125¾	4 3	6 7	1 0	1 6
Nechell's Gas Siding	95½	4 0	6 2	1 0	1 6
London					
L. & N.E. (G.C.)—					
Marylebone	169¾	7 0	10 6	1 0	1 6
Neasden	165	7 0	10 6	1 0	1 6
G.W.—					
Paddington	179¼	7 0	10 6	1 0	1 6

ANNEX C.

RAIL CHARGES ON RAW MATERIALS AND FINISHED ARTICLES.

(1) COTTON TEXTILES.

Comparative cost of railway carriage on one ton of cotton during the various processes of manufacture from the raw state to the finished article.

(Compiled from particulars supplied by the Calico Printers' Association.)

	Charge per ton.		Ratio to total carriage charges.		Ratio to price of cloth.	
	1914.	1926.	1914.	1926.	1914.	1926.
	s. d.	s. d.	Per cent.	Per cent.	Per cent.	Per cent.
Raw cotton, Liverpool to Oldham for spinning	10 9	16 9	10·11	10·19	·286	·188
Cartage in Liverpool (not included in railway rate)	1 6	3 6	1·41	2·13	·040	·039
Yarn, Oldham to Burnley district for weaving	11 3	17 5	10·58	10·60	·300	·196
Grey cloth, Burnley to warehouse in Manchester	11 3	17 5	10·58	10·60	·300	·196
Grey cloth, Manchester to Glasgow district* for finishing	31 2	47 3	29·31	28·75	·830	·532
Finished cloth, Glasgow to Manchester	31 2	47 3	29·31	28·75	·830	·532
Piece goods, finished and made up to export requirements, Manchester to Birkenhead for shipment	9 3	14 9	8·70	8·98	·246	·166
Total carriage charges	106 4	164 4	100	100	2·832	1·849

* Glasgow has been taken as an example for the Finishing Trade as both the Bleachers' Association and the Calico Printers' Association have many works in the Clyde Valley and a fair percentage of cloth is sent there for finishing.

The railway charges are for one ton of raw cotton in the first place and for such a quantity of yarn and cloth as can be manufactured therefrom.

The ratio of carriage charges to the price of cloth in the last two columns of the table are based on the following particulars :—

Per Piece of 30 yards.	*Six months to June, 1914.*	*Five months to November, 1925.*
	d.	d.
Average price of printed and finished cloth	109·43	261·70
Carriage charges	3·19	4·93
Total	112·62	266·63
Ratio of carriage charges to price of cloth	2·83 per cent.	1·85 per cent.

The above particulars are subject to a good deal of variation according to the quality of cloth produced, but they are average figures, and as such are approximately correct when taken over a wide range of business.

29. PIG-IRON AND STEEL PLATES PRODUCED IN CLEVELAND DISTRICT.

(Table handed in by Mr. (now Sir) R. L. Wedgwood to the Railway Rates Advisory Committee, 15th July, 1920, with figures for 1925 substituted for the post war year then quoted).

PIG IRON.

Material.	Quantity per ton of pig iron.	Journey.	Distance.	Rail rate per ton.		Rail charge per ton of pig iron.	
				1914.	1925.	1914.	1925.
Case 1.	cwt.		Miles.	s. d.	s. d.	s. d.	s. d.
Coal	55	Colliery to blast furnace	21	1 11	3 1	5 3	8 6
Limestone	15	Quarry to blast furnace	38	2 5½	3 6	1 10	2 8
Ironstone	70	Mine to blast furnace	10	0 11¾	1 6	3 5	5 3
Pig iron	—	To steel works on Tyne	—	3 11	6 2	3 11	6 2
				Rail charges per ton of pig iron		14 5	22 7
Case 2.							
Coal	55	Colliery to blast furnace	24	1 11½	3 1	5 5	8 6
Limestone	15	Quarry to blast furnace	30	2 1	3 1	1 7	2 4
Ironstone	70	Mine to blast furnace	12	1 0½	1 8	3 8	5 10
Pig iron	—	To steel works at Stockton	—	1 9	2 11	1 9	2 11
				Rail charges per ton of pig iron		12 5	19 7
Case 3.							
Coal	55	Colliery to blast furnace	25	2 1	3 4	5 10	9 2
Limestone	15	Quarry to blast furnace	38	2 3½	3 3	1 8	2 5
Ironstone	70	Mine to blast furnace	14	1 3¼	1 11	4 5	6 9
Pig iron	—	To steel works at Sheffield	—	6 3	9 8	6 3	9 8
				Rail charges per ton of pig iron		18 2	28 0

Average of above three cases.

	1914.	1925.
	s. d.	s. d.
Rail charges per ton of pig iron	15 0	23 5
Standardised on 1914	100	156
	s. d.	s. d.
Market price of Cleveland pig iron per ton	60 0	81 0
Rail charges per cent. of market price	25	29

STEEL PLATES.

Material.	Quantity per 100 tons of steel plates	Journey.	Distance.	Rail rate per ton.		Rail charge per 100 tons of steel.	
				1914	1925	1914	1925
	Tons.		Miles.	s. d.	s. d.	£ s.	£ s.
Pig iron	97	See previous page..	—	15 0*	23 5	72 15	113 11
Limestone	12	Quarry to steelworks	15	2 3½	3 4	1 8	2 0
Iron ore	26	Port to steel works	5	1 2	1 10	1 10	2 8
Coal and coke	40	Colliery to steel works	13	1 2	1 11	2 7	3 17
Steel plates	100	To shipyard on Wear	—	3 8	5 10	18 7	29 3
						96 7	150 19

	1914.	1925.
	s. d.	s. d.
Rail charges per ton of steel plates	19 3	30 2
Standardised on 1914	100	156
	s. d.	s. d.
Market price of steel ship plates per ton	134 8	181 10
Rail charges per cent. of market price	14·3	16·6

3 IRON AND STEEL PRODUCED IN SOUTH YORKSHIRE.

[Compiled from particulars published by an Iron and Steel Company in May, 1925.]

	Pig Iron.		Blooms.		Plates, Sheets and Bars.	
	1913.	1924.	1913.	1924.	1913.	1924.
(*a*) Cost of conveying materials by rail to works (per ton of product)	*s. d.* 7 0	*s. d.* 10 2½	*s. d.* 8 10¾	*s. d.* 13 3¼	*s. d.* 12 10	*s. d.* 19 3½
(*b*) Cost per ton of conveying product by rail from works to four representative destinations—						
Birmingham (85 miles)	6 1	9 5	6 6	10 0	8 8	13 4
Sheffield (7 miles)	1 4	2 3	1 4	2 3	2 7	4 3
Leeds (32 miles)	3 8	5 9	4 0	6 3	5 2	8 1
Manchester (54 miles)	4 8	7 3	5 1	7 11	6 1	9 6
(*c*) Average of cases quoted under (*b*)	3 11¼	6 2	4 2¾	6 7¼	5 7½	8 9½
Total average rail charges [sum of (*a*) and (*c*)]* ..	10 11¼	16 4½	13 1½	19 10½	18 5½	28 1
Percentage of increase in 1924 over 1913	—	49·71%	—	51·42%	—	52·14%

Note.—In the print containing the particulars on which the above table is based, the Company stated that, while the average cost of railway carriage was over 50 per cent. more than pre-war, the selling price of steel was only about 30 per cent. more; and that the increased charges represented 5 per cent. on the total cost of production, or 15 per cent. of the difference between the selling price of finished steels in 1913 and 1924.

* In order to obtain exact figures representing the company's total average rail charges per ton, it would be necessary to take account of the quantities of goods sent to each of the destinations mentioned as well as of goods sent to other destinations. In the absence of this information, an arithmetical average of the figures relating to the four representative destinations quoted has been used.

COMMITTEE ON INDUSTRY AND TRADE.

FACTORS IN INDUSTRIAL AND COMMERCIAL EFFICIENCY.

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